Instructor’s Notes for Mineral Cleavage CogSketch geoscience worksheet

This worksheet uses the sketch-understanding program with built-in tutor: CogSketch. Therefore, students, instructors, and/or institution computer labs need to download the program from here: <http://www.qrg.northwestern.edu/software/cogsketch/> There are many introductory geoscience worksheets that have been developed using this program. Each worksheet has a background image and instructions for a sketching task. At any point during the worksheet, students can request feedback from the worksheet tutor and their sketch is compared to the solution sketch. The built-in tutor identifies any discrepancies and reports pre-written feedback to help the student correct their sketch until they are done with the activity. Once worksheets are emailed to the instructor, worksheets can be batch graded and easily evaluated. This program allows instructors to assign sketching activities that require very little time commitment. Instead, the built-in tutor provides feedback whenever the student requests, without the presence of the instructor.

This worksheet focuses on understanding mineral cleavage, what controls mineral cleavage, and how cleavage at the atomic scale correlates to cleavage at the macroscopic scale. Students complete 3 tasks in this worksheet, focused on the cleavage of mica and amphibole. The first task focuses on common objects that have similar “cleavage” to mica (a stack of wood) and amphibole (snake scales). Students sketch the cleavage planes on the stack of wood and snake scales. They are asked to isolate a particular plank of wood or snake scale and draw the lines where you would “cleave” the item to get the isolated part. The second task has students sketch cleavage planes onto images of the atomic structure of mica and amphibole with weak bonds highlighted in red. The cleavage of mica and amphibole are in the same orientations as the cleavage planes in the common object task to help students see the pattern in the complex structure.

The last task has students match the atomic structure images of mica and amphibole to hand samples that clearly show the orientation of cleavage. Again, the cleavage plane orientations are kept similar to help students identify the pattern. Instructors should note that the matching arrows are a little different than directional arrows. Students draw an arrow, and then select relation from the glyph type menu. After selecting “matches” from the “What is this?” list, the green and purple dot should automatically lock to the correct images indicated by their arrow. If they do not, students should drag the green dot to the atomic structure and the purple dot to the hand sample. Instructors should become familiar with this task.

The aim of this progression is to link something the students know (common objects) to something they don’t know (atomic structure and hand samples), while keeping the geometry of cleavage planes the same. After all tasks are complete, students answer 5 multiple-choice questions.

Students should be encouraged to use the worksheet tutor throughout completing the activity. We have prompted them in the instructions, but further reinforcement may help encourage its use. If an instructor is noticing a problem with the worksheet and wants to change something (the wording in the instructions or feedback, or the ink tolerance), they may alter the worksheet using the worksheet property editor. You can learn more about this property editor in the user manual, included when you download the program. Basic instructions for instructors, students, and grading worksheets are below. For further assistance with program problems in CogSketch, one can contact the Northwestern QRG group from the download page. For further assistance regarding this specific worksheet, please contact the worksheet author, Bridget Garnier, bridget.garnier@gmail.com

Starting Here for Instructors:

1. Download and install CogSketch (<http://www.qrg.northwestern.edu/software/cogsketch/>). Download the worksheet.
2. Open the program and complete the Worksheet Basic Tutorial to understand how to use CogSketch.
3. Click Open Worksheet and find the Earth’s Interior worksheet. \*I highly recommend testing the worksheet so you are very familiar with it and that it works for you.
4. Since this is an unlocked worksheet, the instructor will need to set a password to prevent students from finding the solution sketch. Once the worksheet is opened, click Edit -> Worksheet Property Editor -> Click the Security tab -> enter the password, click Apply, and save worksheet. The worksheet is now password protected and can be distributed to students. The same steps can be used to change the password
5. If an instructor wishes to make any changes to the worksheet, click Edit -> Worksheet Property Editor. This is the authoring interface and all changes can be made here. More information about the Worksheet Property Editor can be found in the user manua,l which is included when you download the CogSketch program.

Instruction to give to students:

1. Download and install CogSketh (<http://www.qrg.northwestern.edu/software/cogsketch/>). Download the worksheet.
2. Open the program and complete the Worksheet Basic Tutorial to understand how to use CogSketch.
3. Click Open Worksheet and find the Earth’s Interior worksheet. Save As with a new file name.
4. Use the sidebar at the right to find tabs for the problem, feedback, and questions. Read the instructions in the Problem tab to complete the tasks. Click the Feedback tab and click Update to receive feedback on your sketch. The Properties tab is used to define/label glyphs. Lastly, the Questions tab contains the multiple-choice questions for the end of the activity.
5. Once the worksheet is completed, save the worksheet and email it to your instructor.

To grade worksheets:

1. Put all completed worksheet files in the same folder. Can only be worksheets of the same type (e.g. all Earth’s Interior worksheets)
2. Open CogSketch and click Gradebook
3. Click New Class and enter information
4. Double click on the class and click on New student. Enter the information for all students in the course
5. Click New Assignment, and enter information
6. Double click on Assignment and click on Add Sketches. Find folder of sketches and highlight all sketches you want graded, click Open.
7. Select the student who completed the worksheet and Click Ok.
8. Upload an additional worksheet that has the solution sketch using the same Add Sketches button. The blank worksheet works just fine. After clicking open, check the box that says “Solution Sketch?” and click Ok.
9. Click Grade worksheets and enter the worksheet password. Worksheets will be graded and scores will be updated in the Gradebook. Each worksheet can be opened by double clicking on the worksheet in the gradebook.