

MONT 109N – Mathematics Across Cultures
Information for Midterm Exam
March 16, 2011

General Information

The first midterm exam will be given in class on Friday, March 25 (this is a week later than originally announced). It will cover the mathematical and cultural/historical material we have studied since the start of the semester. There will probably be some questions dealing with aspects of the material we discussed from *Collapse*.

This means in particular

1. “Modular arithmetic” and applications to questions about calendrical cycles (as in Problem Set 2).
2. The Classic Mayan number and calendar systems (see Problem Sets 1 and 2). Note: For questions about computations within the Sacred Round and Vague Year calendars, I would give you the lists of “month” names in order to use. There is no need to memorize them.
3. Ideas about maps, models, ways of representing information (Marshall Islands “stick charts” as a key example).
4. How societies can choose to succeed or fail (*Collapse*); the examples of the Easter Islanders; Mangareva, Pitcairn and Henderson Islands; the Classic Maya.
5. The *kalah* form of the *mancala* game family (see Problem Set 3) (know the basic rules and how to analyze what happens with particular moves).
6. *Symmetry* the definition of a group, the classification of the 17 “wallpaper groups” applications to Escher’s regular subdivision drawings, Islamic art. (A possible question here would be to try to identify the type of a plane pattern in our classification, *given a table of the different types* like the one from a class handout. As in the case of the Mayan calendar, it will *not* be necessary to memorize the 17 types.)

Format

Approximately 40% of the exam will consist of one or two short mathematical problems similar in format and content to things you have seen on the problem sets. The remaining approximately 60% will be divided, in a way to be determined, between multiple choice questions, short answer questions, and a short essay. This 60% will concentrate on aspects of the history and ideas from *Collapse*.

Essay

The essay question will be one of the following:

- 1) Describe the Sacred Round, the Vague Year, and the Long Count used by the Classic Maya in their calendar system. The date March 25, 2011 would be given in the full Mayan system by 12.19.18.4.3, 4 Akbal, 16 Cumku. Explain what each of these means and which part of the system it refers to. After the collapse of the Classic Maya civilization about 900 C.E., Long Count dates were no longer used, although the Sacred Round and the Vague Year remained in use. Given what we know about the situation of the Classic Maya collapse, why do you suppose that was true?
- 2) What is the mathematical meaning of *symmetry*? What examples of symmetry transformations have we used in discussing examples from visual art in this course? What is the mathematical concept of a *group* and why is it important for the study of symmetries? Describe how symmetry groups can be used to classify plane periodic patterns. In what sense are two patterns of the same type similar? In what ways can they be different?
- 3) How important are leaders in determining the success or failure of a civilization? To what extent did bad leadership contribute to or cause the collapses described by Jared Diamond that we talked about in our discussions of *Collapse*? Can wise leadership avert or minimize the effects of situations that might tend toward societal collapse? What do you think about the current performance of leaders in the contemporary world?

Miscellaneous Groundrules

No use of cell phones, pagers, I-pods, I-pads, e-readers, or any other electronic devices beyond a calculator will be allowed during the exam – turn them off and stow them in your backpack if you must carry them with you.