

Harkness in a Math Classroom

Successful Harkness in a math classroom is dependent upon the problems given to students. If you give students purely procedural problems, there won't be a very fruitful conversation around that. Exeter Mathematics I, II, III/IV, have multiple problems covering almost every standard we teach and are great resources.

More Procedural	More Harkness
- Giving students the formula to calculate the nth term in a sequence$a_n = a_1 + (n - 1)d$ - Giving students multiple questions that require them to find the nth term	- Giving students a problem like below without a formula, having them come up with the formula themselves. - Consider the sequence of numbers 2, 5, 8, 11, 14, . . . , in which each number is three more than its predecessor. (a) Find the next three numbers in the sequence. (b) Find the 100th number in the sequence. (c) Using the variable n to represent the position of a number in the sequence, write an expression that allows you to calculate the nth number. The 200th number in the sequence is 599. Verify that your expression works by evaluating it with n equal to 200. (<i>From Exeter Math I, #39</i>)

By requiring students to figure out the formula for themselves, and have a discussion around, they are taking more ownership of the learning.

Procedural math problems have a time and place in every math classroom, but don't always lead to deep conversations in Harkness or highest levels of learning.

Other valuable things to consider in a Math Harkness classroom:

1. You want to encourage opinion (e.g., "what is another way to solve this problem?") so that there is actually discussion.
2. It's inevitable that students are going to be teaching each other. You can create a good environment by explicitly encouraging students to make sure that everyone at their table knows how to do the problems. You can also say that you will be evaluating students at the end of Harkness by randomly selecting a student to explain the problem. That will help ensure that all students get an understanding.
3. Have each student put their work and answer for one homework problem on the board. Then they have to explain the work and answer of another student to their table.
4. Have students explain to the table why they answered a problem incorrectly.
5. Have students sign up on the board to either write or present a problem at the start of class. That way, students are actively engaged in the learning process, either as writer or presenter, and have the ability to select problems they're excited to discuss.

From Aida Conroy, Road Map 2019