History of Math: Egypt

For the Instructor

Learning goals targeted in *The History of Math* are:

> **Goal 1**: To teach students that math is a living series of developments, born of insight and hard work, and often hotly contested.
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> **Motivation:** students tend to see math as a monolithic structure, unchanging and uninteresting
>
> **Method:** students will explicitly grapple with the development of specific areas of math and related sciences as they play. Stories of mathematicians, the struggle for immortality built into the game, and the culminating math duel, will each emphasize this lesson.

> **Goal 2:** to give students a sense of the flow of mathematical reasoning. Why do we have to learn about angles? Because through this understanding, you can measure the distance to a star, build a ship, or develop new technologies that reshape the world.
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> **Motivation:** In the middle of the hard work of actually learning math, it's easy to lose the big picture in the details
>
> **Method:** progression in the game is tied directly to 'buying in' to mathematical progression in certain areas. A concept of a postulate leads to a concept of inductive reasoning, deductive reasoning, and theorems, which allow one to demonstrate that certain ideas are TRUE.

> **Goal 3:** to teach students that history is the result of decisions made, contested, celebrated, hidden, denied, and lost
>
> **Method:** this goal dovetails nicely with our first goal; as students examine the history of math, they will develop a more nuanced sense of history
>
> Note that directly teaching mathematical concepts is not a goal of our game. Rather, using mathematics is built into the game. Players will be asked to identify and work with prime numbers, squares, square roots, angles, Platonic solids, mathematical patterns such as the Fibonacci sequence, and simple equations as they play.

In terms of the Common Core curriculum (https://www.thecorestandards.org/Math/Content/6/introduction/), our game aligns with the following requirements for 6th grade students:

- Understand ratio concepts
- Find common factors and multiples

- Reason about and solve one-variable equations and inequalities
- Make sense of problems
- Reason abstractly and quantitatively
- Use appropriate tools strategically
- Look for and make use of structure

From a history perspective, this game aligns with the question, “How does technology influence connections among human settlements and the diffusion of culture?” from the Connecticut Elementary and Secondary Social Studies Frameworks.

“The History of Math” has a moderately complex structure. Recognizing this, we scaffolded the game to build cognitive load across eras. Thus, the simplest structure appears in the first era, Ancient Egypt. Over time, we will release more eras which advance mathematical Innovations and introduce important mathematicians that the Players can meet and support.

We recommend that anyone who is going to facilitate the game, including teachers, aides, parent-aides, and peer instructors, set aside time to play one game themselves first.

You will find a debrief section at the end of this document. We recommend that you give your students time to “play” the debrief after the game is done. If you are one of our selected playtest partners, you will find a playtest section after the debrief. Please run both the debrief and playtest with your facilitators and with your students. We ask that you take notes and share anonymized feedback from the debrief and playtest with us. Please compile facilitator feedback separately from student feedback, and provide each in an anonymized form.

The History

General History notes

All the Figures and Relics are real mathematicians and artifacts dealing with mathematics. Their locations on the time tracks are approximate. Errors come from two sources: 1.) the necessarily rough estimates of the time of creation of artifacts (and in some cases, the rough approximations of the time of birth and death of the Figures); 2.) a desire to ensure that no Figure or Relic appears so late in an era that it is impossible to Immortalize them.

Debrief

Was the game fair?

Were the rules clear?

After playing “The History of Math”, has your perception of math changed? If so, how?

After playing “The History of Math”, has your perception of history changed? If so, how?

Stars and wishes?

Playtest questions

All of the “Debrief” questions, plus

Did you feel you had enough control over your time-traveler’s movement and actions?

Paying the cost to sponsor a Relic. Was it

- Too easy
- Just right
- Too hard

The reward for Immortalizing a Relic. Was it

- Too low
- Just right
- Too high

Game length. Was it

- Too long
- Just right
- Too short

This game has a lot of symbols that represent resources and actions. Name or describe one symbol that was hard to remember, and one symbol that was easy to remember.

Thank you for playing our game!