Team Members

➔ Royden Luckey - Collaborator
➔ Andrii Sagaidak - Collaborator
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All team members contributed to brainstorming, writing, sketching, making prototypes, testing and editing.

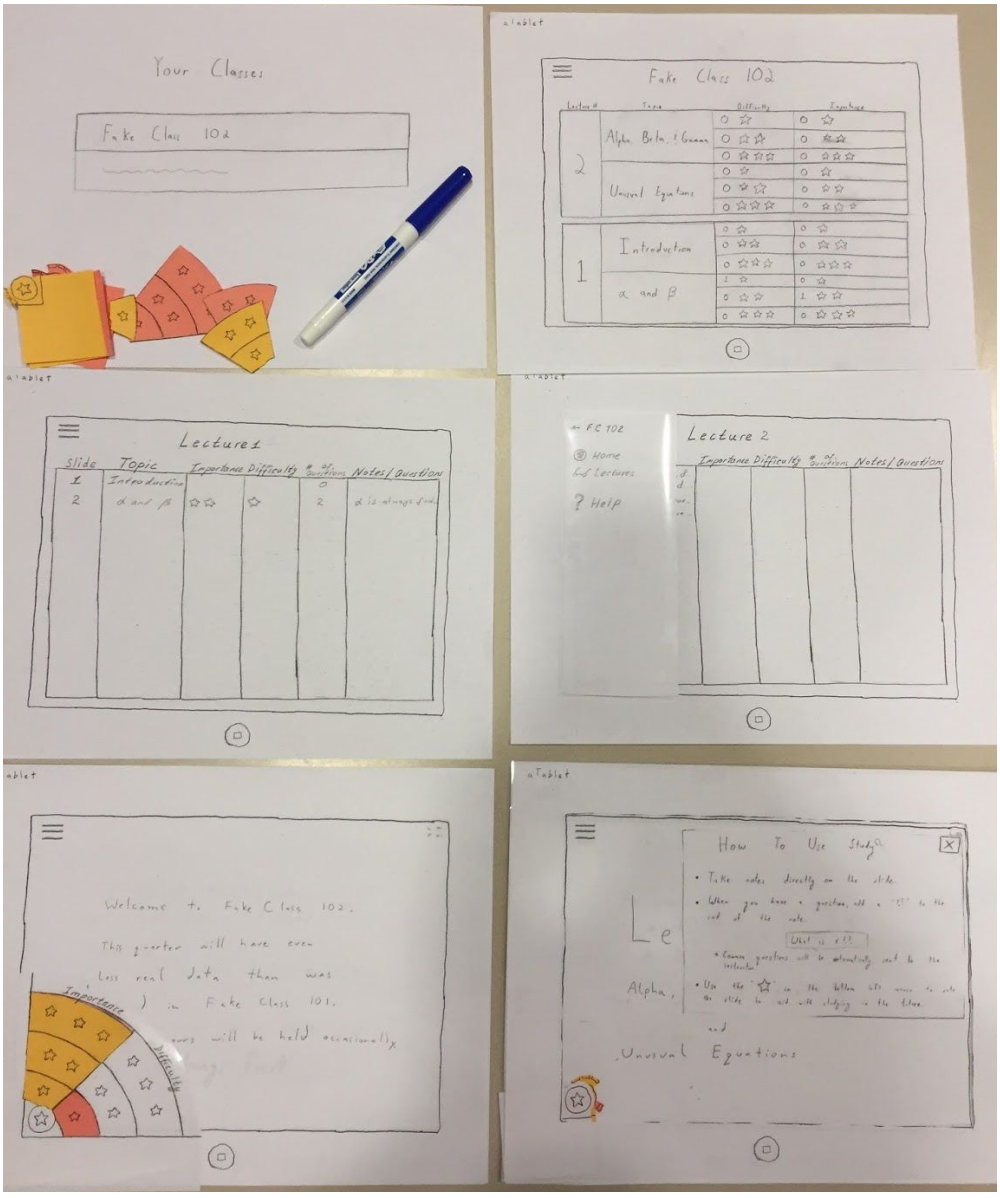
Problem and Solution Overview

Our research identified that many students face difficulties asking questions aloud in class, and get varying value out of sections as a result. Furthermore, we found students consistently attempt to study areas they identify as difficult or important, but are inconsistent in keeping track of those areas over the course of a class term. Our solution aims to alleviate both of these problems by providing a low-distraction interface for taking in-class notes, and using that data to increase instructor-student communication and student self-evaluation. Students can write notes and questions directly on slides, as well as quickly mark if a slide is difficult or important. Similar questions will be automatically aggregated, and frequent questions will be displayed live to the teacher to facilitate immediate feedback, without requiring shy students to ask questions aloud. These questions, notes, and ratings can then be referenced and sorted later, so students can effectively judge their understanding of topics and choose essential areas to study.

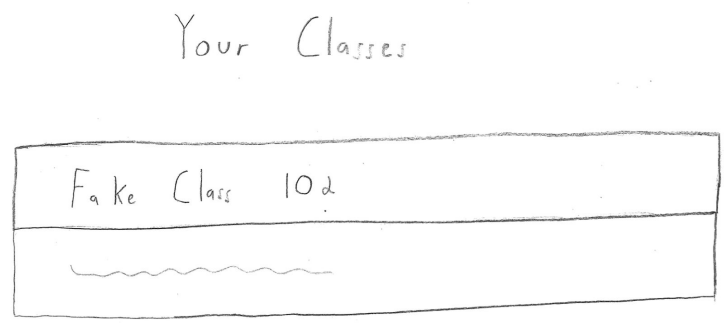
Initial Paper Prototype

We are designing an app to run on a tablet allow students to ask community-driven questions anonymously during class and perform data-driven studying outside of class. The prototype supports viewing slides where students can take notes, add ratings, and ask questions during class. Students can view their generated data in a concise view outside of class, leading to improved study quality and efficiency.

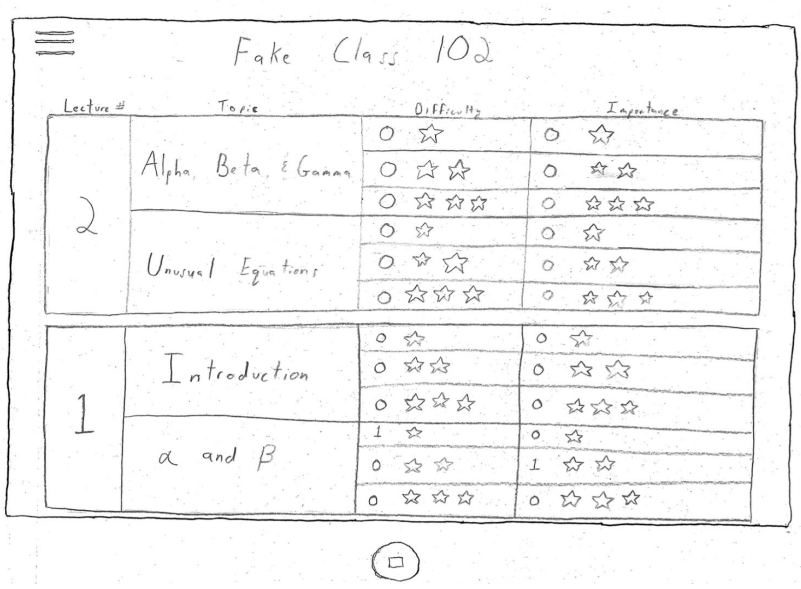
Overview



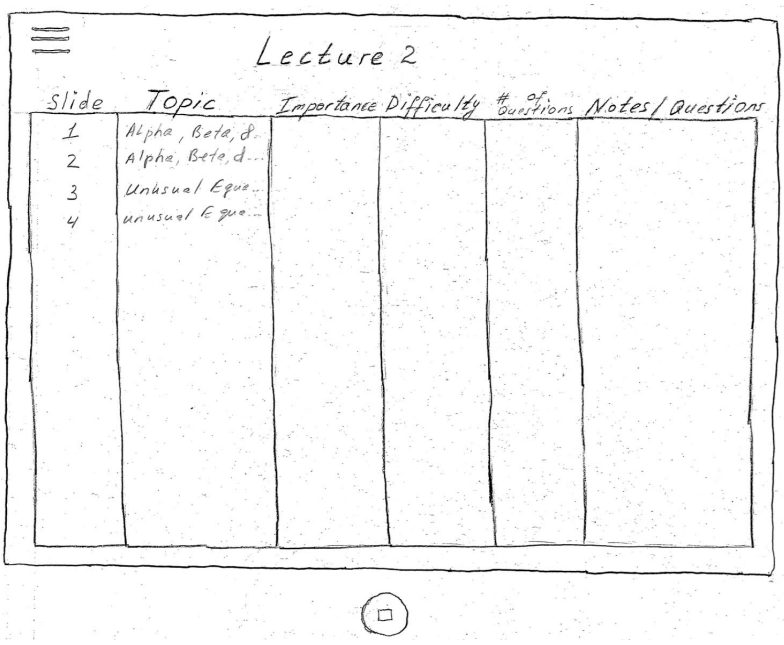
In-Class interface:



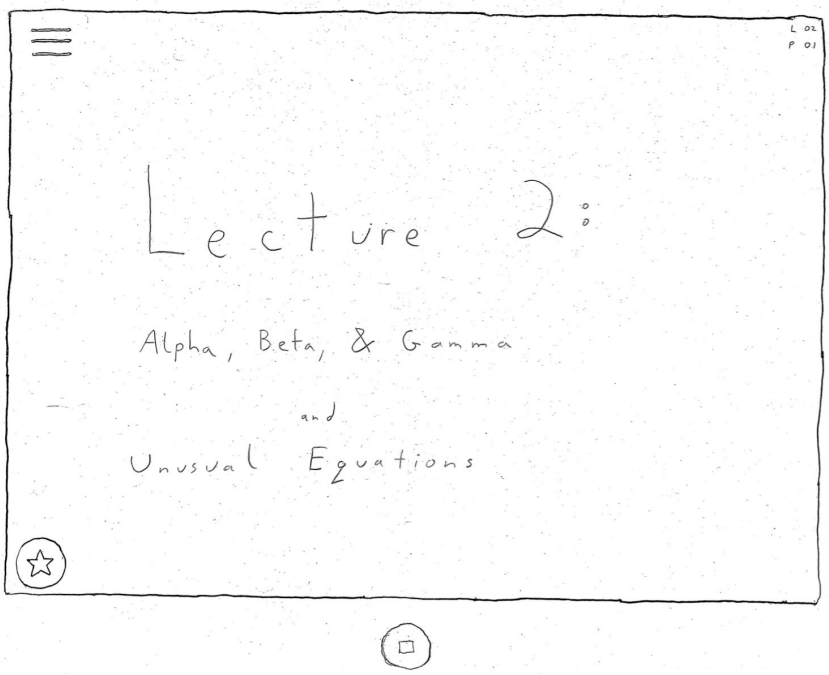
When opening this app, a student will see a list of classes they are enrolled in.



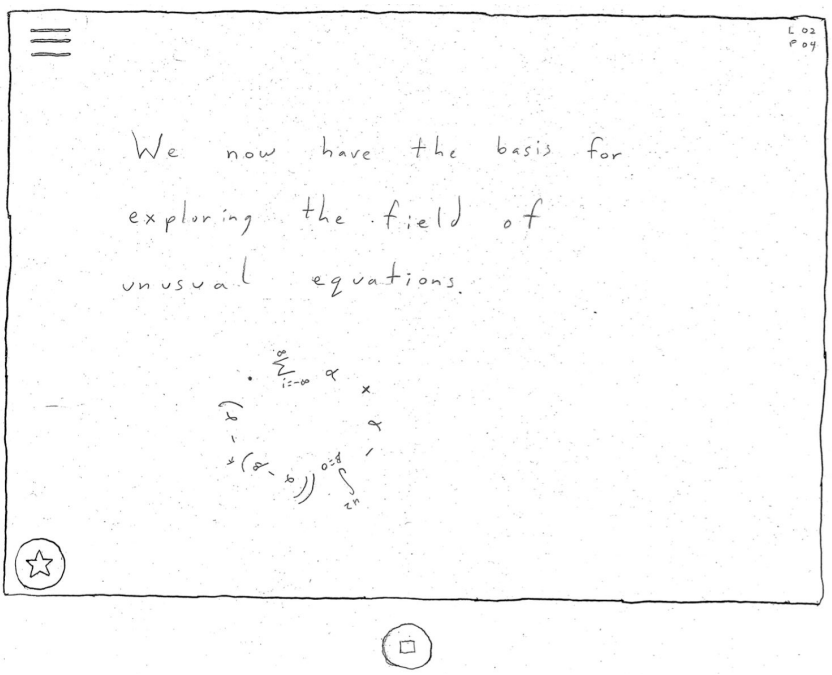
After choosing a class, they will see the lectures list. Each lecture includes topics it covers, and each past topic is rated by the student on difficulty and importance.



When clicking on a new lecture, the student will see a list of the slides for that lecture, with the topic that slide is covering and additional information about each slide.

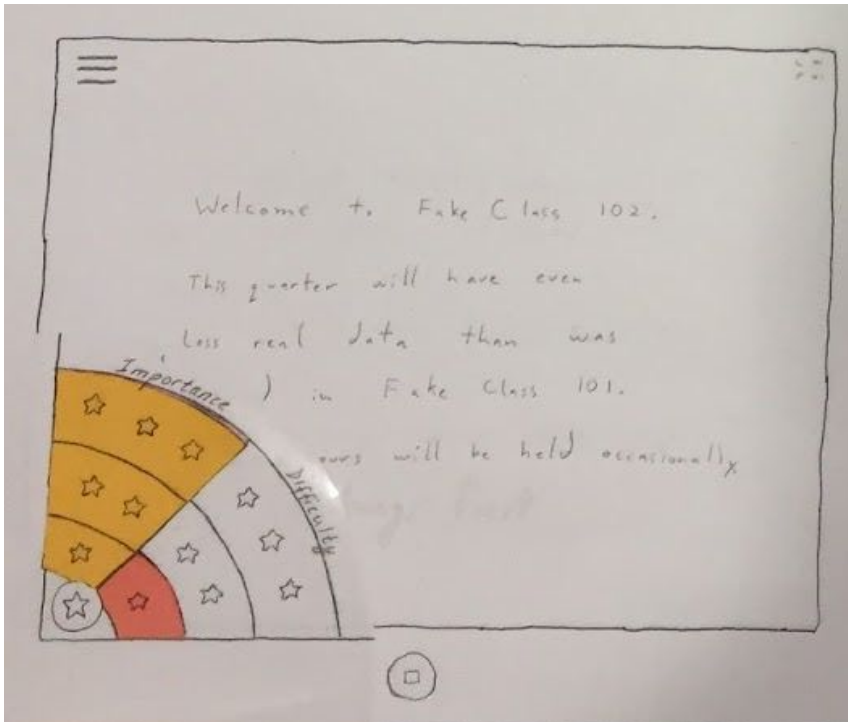


The student can click on a slide from the lecture, and it will open full-screen.

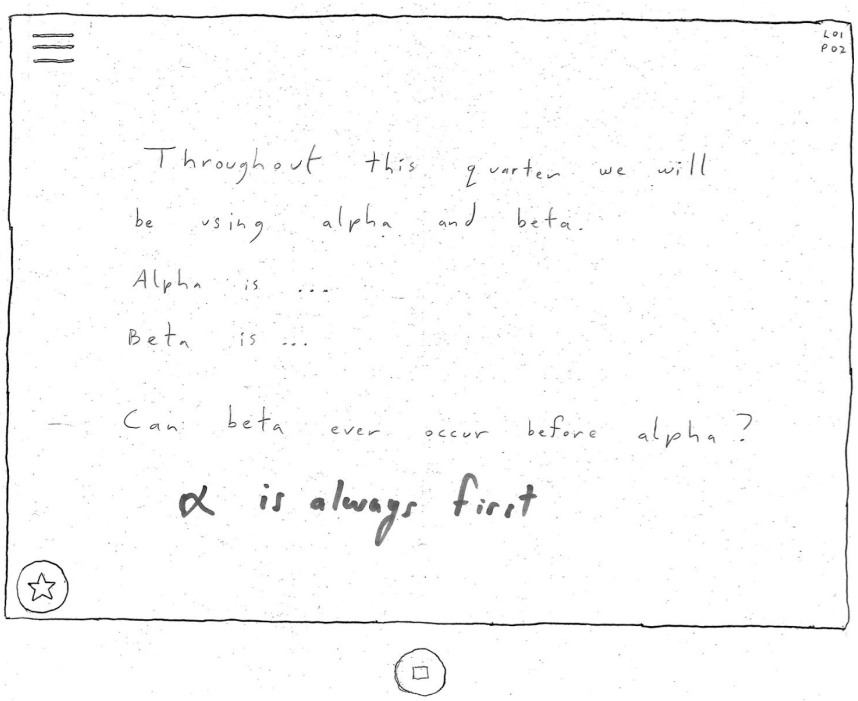


The student can follow along through the lecture slides with the instructor.

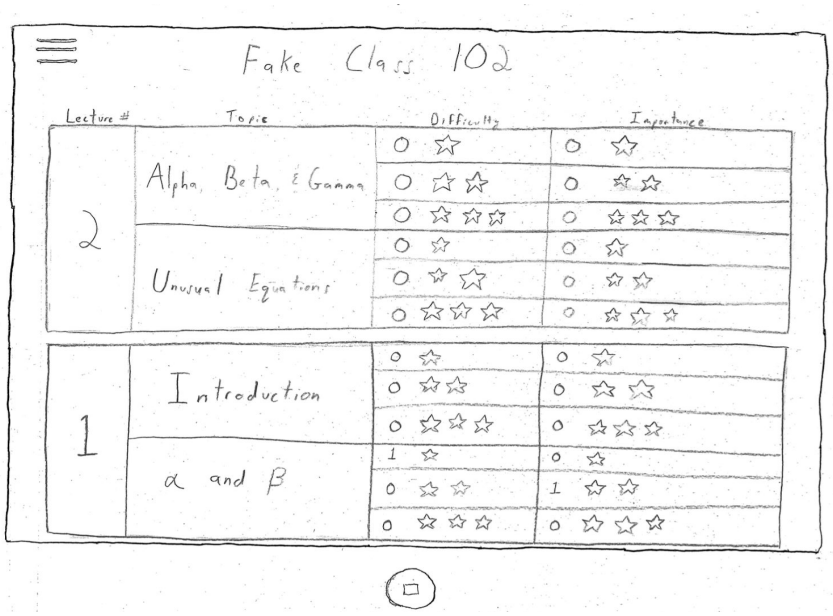
In the initial design, writing a question, arrow, or circle, and then writing a “??” on/near it would submit a question in-class.



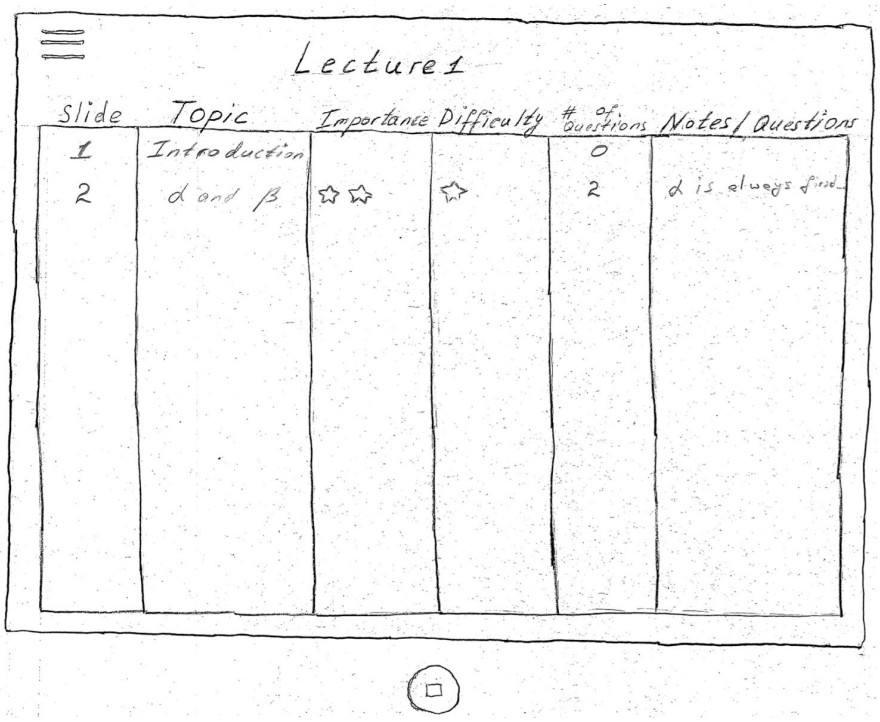
On each slide there is a star in the lower left corner that, when clicked, opens a menu. On that menu, students can record the difficulty and importance of the slide.



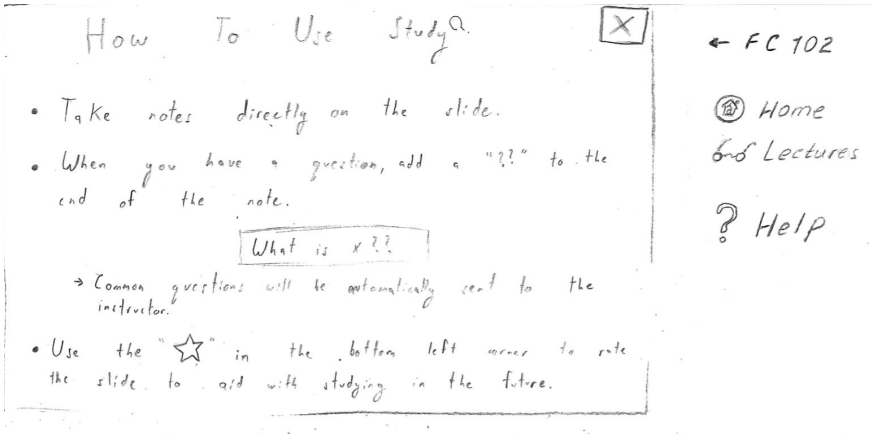
Students can take notes for themselves and ask questions directly in the app. In order to ask a question students use append double question mark to the end of the note.



When the student later goes to study the material from class, they can view how difficult and important the material was and use that to guide data-driven studying.



Students can also view the importance and difficulty of each slide as well as its notes/questions to further support data-driven studying.



When the students first open the app, or any other time they click the help button on the menu, a help screen comes up that explains how to use the app

Testing Process:

Heuristic Evaluations

We ran two heuristic evaluations of our design with two of our CSE 440 classmates. The first evaluation was performed by Royden with Yadi participating. The second evaluation was performed by Andrii with Hugo participating. We first explained and then presented the design to our participants, noting down any issues they identified along with their rating of severity. Our team then went through the identified issues and assigned fixability ratings to each item. We then proceeded to update our prototype based on the feedback received.

Usability Testing Sessions

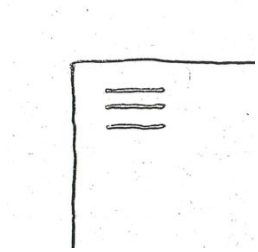
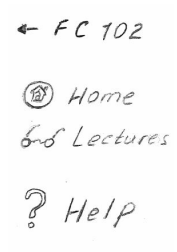
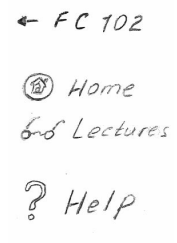
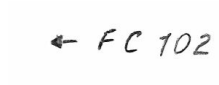
We conducted our usability tests with three students of different backgrounds. The first usability test was conducted with a senior in the CSE department who is taking a mix of STEM and liberal arts classes and identifies as male. The second test was conducted with a pre-major sophomore student who is planning to study either CSE or HCDE and identifies as male. The last usability test was conducted with a senior BioEngineering student, who identifies as female, and considers herself to have low technical expertise. All the students were purposely chosen to be of different genders and from different majors since the tool can be used in any class.

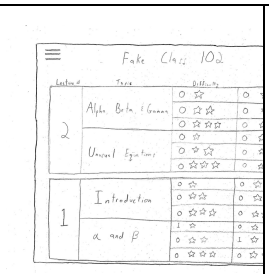
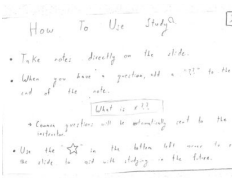
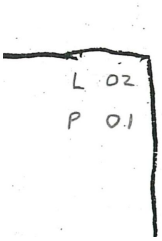
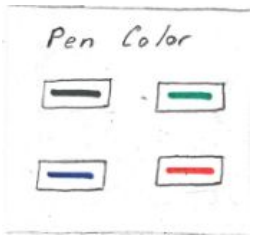
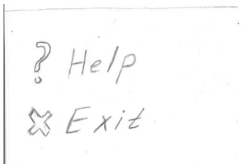
The usability tests progressively improved after each test. Between tests our team discussed how to improve each role, especially the script used by the facilitator to guide the participant. We also modified the prototype between each test, integrating needed changes or suggested improvements from the previous evaluation or test. The major improvement identified early on was to provide more context for the student, so they were motivated to complete the task without providing details or additional subtasks.

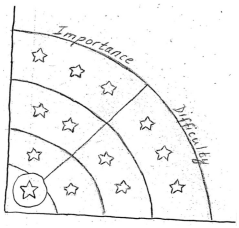
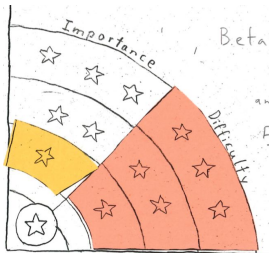
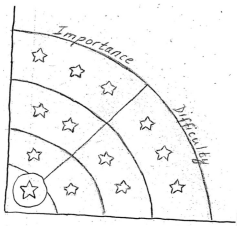
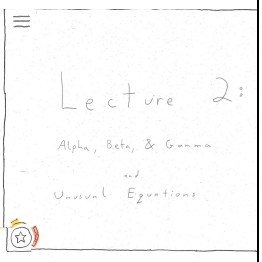
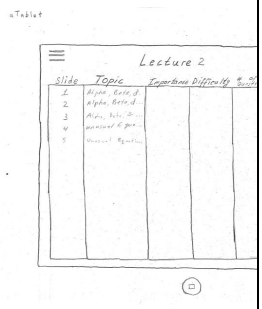
Testing Results:

Heuristic Evaluations

From our heuristic evaluation we found the following issues, presented with their severity, the heuristic they violated, and our plans for/current fix.

Issue	Image	Heuristic violated	Severity	Solution
No menu and/or help button on the class page.		10.) Help and documentation	1	Added menu to class list. Required second copy of the menu without current class.
Unclear that home button is class list.		4.) Consistency and standards	1	Keep home icon, but change description to classes.
How to get back to slides		3.) User control and freedom	3	Add “Slides” to menu options.
Back Button was confusing. Closes menu rather than going back to slides.		7.) Flexibility and efficiency of use	1	Replace back button with menu button (so same icon is toggle).

Lecture Page was too visually busy (repeated on eval 2)		8.) Aesthetic and minimalist design	3 / 2	Have reduced number of displayed star counts.
Help Menu - improve the note next to the description of the question system		4.) Consistency and standards	4	Changed how you ask questions, and entire help screen as a result.
Lecture 2 - Change page “P02” to “Slide 02”		4.) Consistency and standards	1	Wasn’t critical change at that time. Later it was removed from slides and added to menu.
Make sure you let people know that this is their tablet, or else need logout on menu.		N/A more about the testing itself than the design	2	Including in usability test introduction.
Add pen color and size. (repeated on eval 2)	No option before	3.) User control and freedom	2 / 3	
Want logout/exit in the main menu	No option before	7.) Flexibility and efficiency of use	3	Added Exit to menu. Not currently planning logout as personal device. 

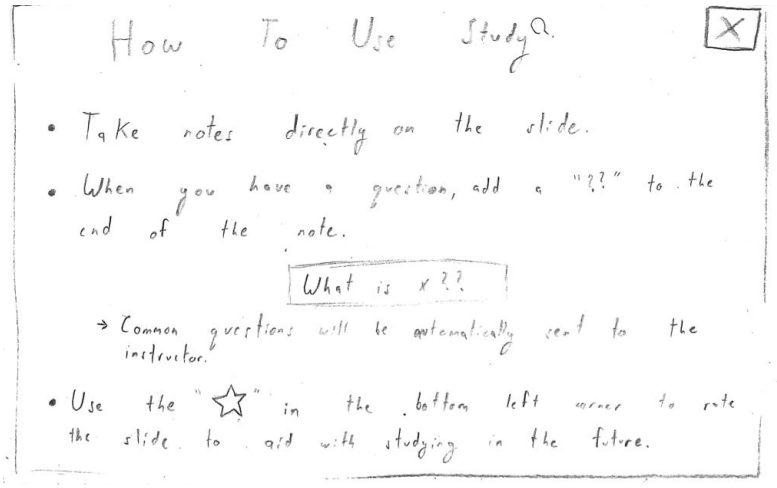
Unclear how to set ratings back to “no rating”.		3.) User control and freedom	2	Added empty area to slide down or can click on same spot. 
Unclear that ratings menu can both slide and click.		4.) Consistency and standards	3	No cosmetic change. Update “computer” to handle either and improve verbal description of interaction.
Cannot see/write on slides under menu buttons on slides.		3.) User control and freedom	2	Considering buttons fading to translucent and/or auto-shifting position if writing very close.
Unclear that each slide on list of slides is clickable.		4.) Consistency and standards	3	Partially a problem with paper prototype. Considering slides will be hyperlinks to make it easy to see they are clickable.
User may want to write “??” on slide without asking question. Would prefer graphical icon.	“??”	3.) User control and freedom	2	Added graphical drag-and-drop “?” icon.

Usability Testings

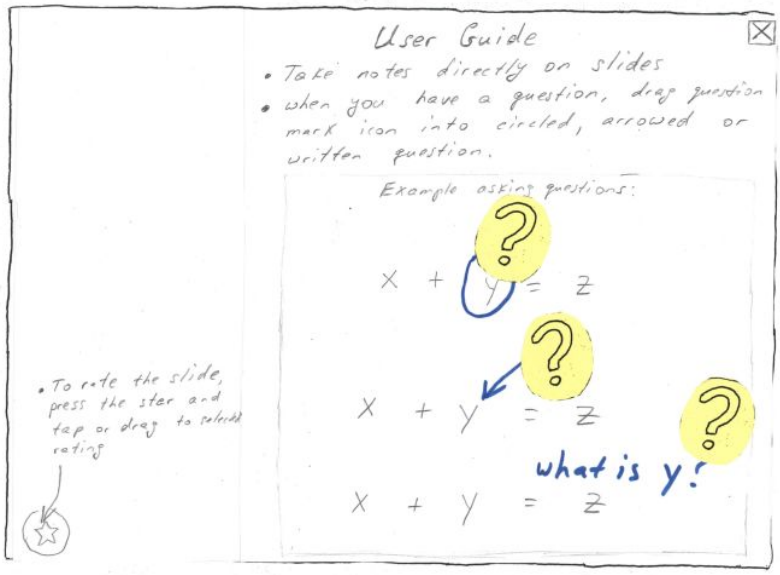
Question-asking Mechanism

Severity: 3

The first participant found the directions for asking a question to be confusing. He initially tried to use the “Help” menu to discover how to ask questions, then tried pressing the “What is x??” box in the help menu, and finally tried tapping the slide on the point they found confusing. In the end, they were unable to proceed without guidance from the team to write “??” to indicate a question, revealing a critical flaw in the design, either in how to ask questions, the help menu, or both. During the debrief, the participant requested for us to make asking a question more graphical, and expressed positive interest in dragging a “?” icon.

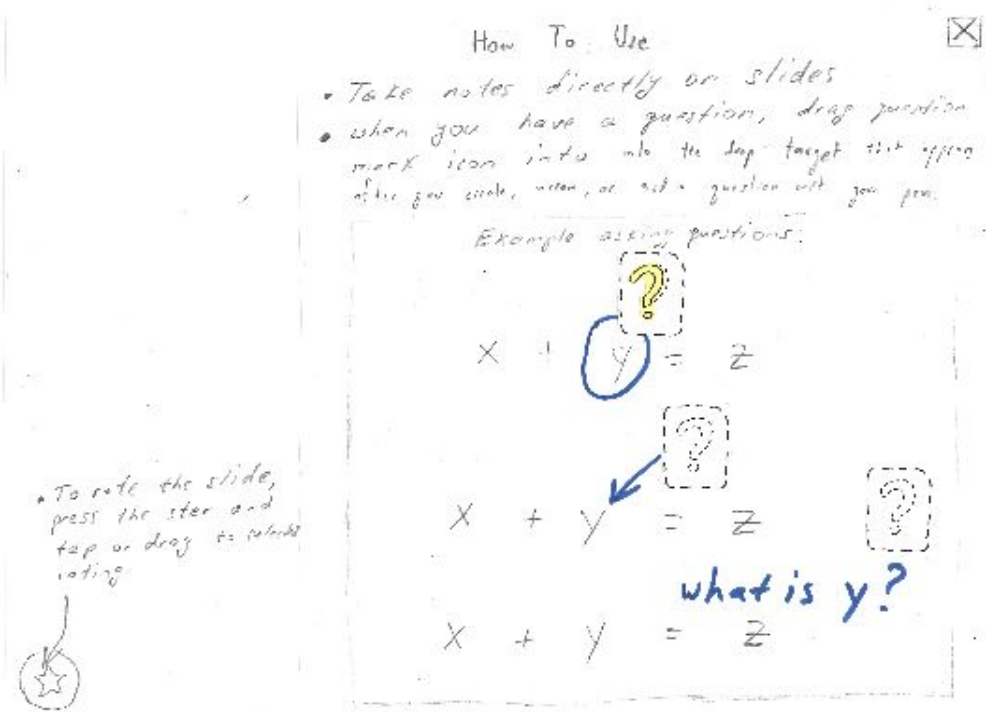


Our fix was to change both the question asking mechanism to a drag-able question mark icon which sits in the upper-right corner of the note-taking screen, and to expand the help menu to include multiple examples.



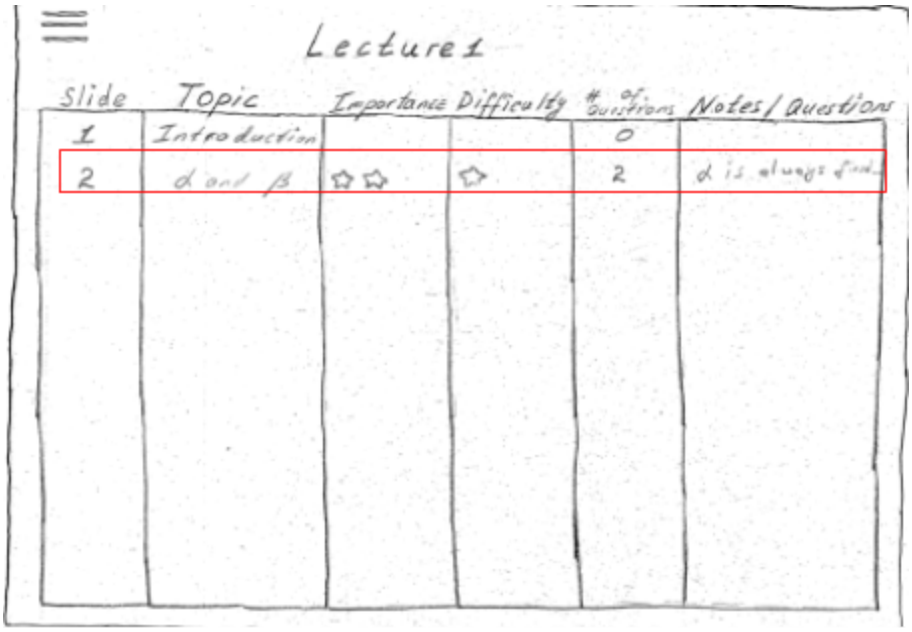
Severity: 2

For our second participant, the question icon was clearly important. However, it was not clear that he should drag the yellow question mark icon onto his question. Our fix was to add semi-transparent question marks to potential questions in order to suggest drop targets. These drop targets appear briefly if you tap the question mark on the lecture slide, and stay visible while dragging the question mark. Finally, we also updated the help menu examples to demonstrate drop targets and a yellow question mark on top of a target.



Slide List

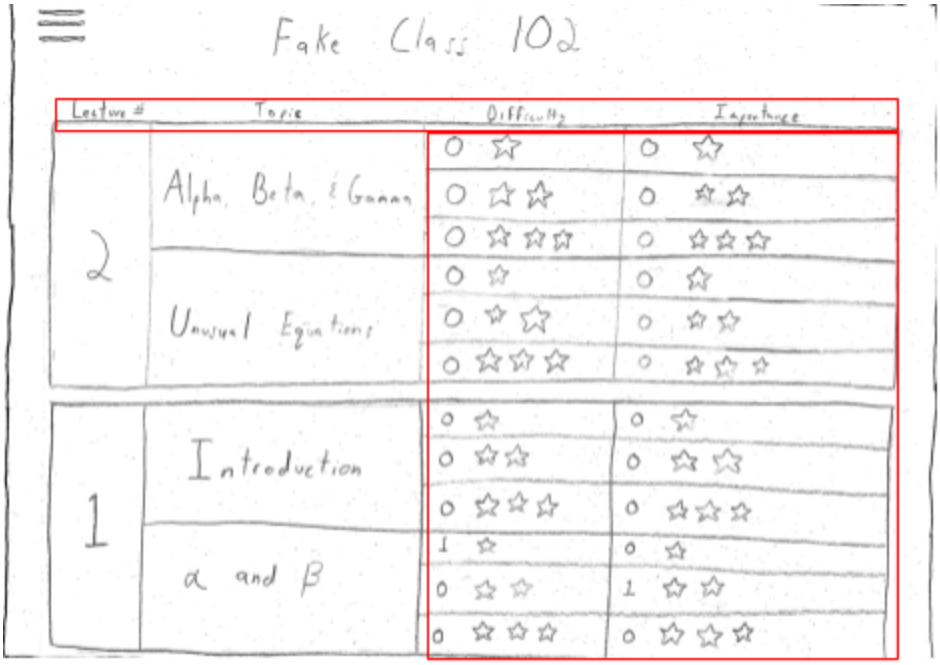
Severity: 2
The first participant almost failed to notice that each row in the list of slides in a lecture is clickable. Our proposed solution is to turn the slide list page into a more “card” based layout, similar to the lecture list page. This would help make it appear more interactive than a plain table. We waited to see if this issue arose in other user tests as well, since we suspected this was partially due to the lack of perfectly straight lines/text involved in a paper prototype.



Original: Table view hides interactive aspects.

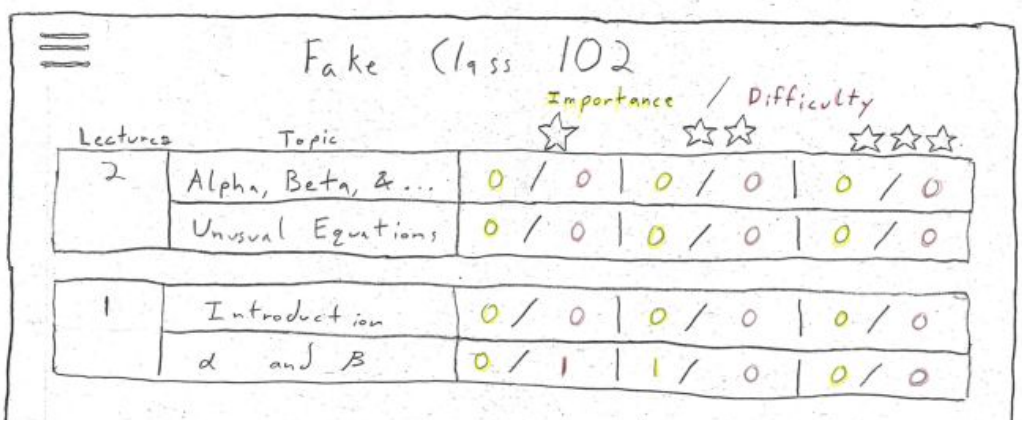
Lecture List

Severity: 1 - The first participant found the layout of the lecture list to be a little noisy, although he did appreciate that all of the information was available.

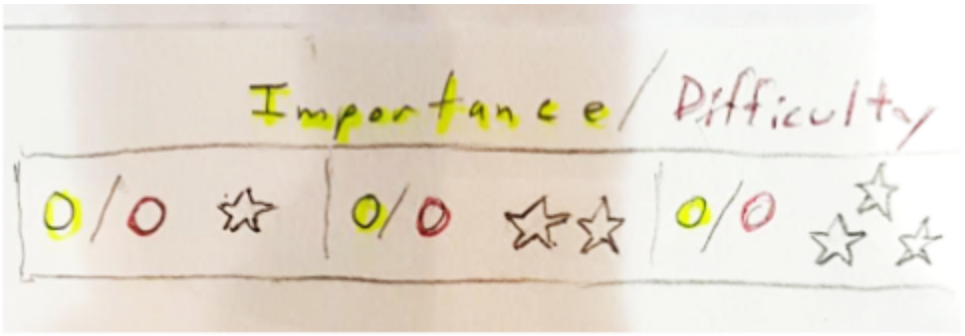


Original: The titles are too small and the start layout is too busy.

We had been considering this as a possible issue, so we offered two possible solutions during the debrief and received feedback that displayed option B, with stars on each line was prefered, as option A required the user to keep track of two headers simultaneously.



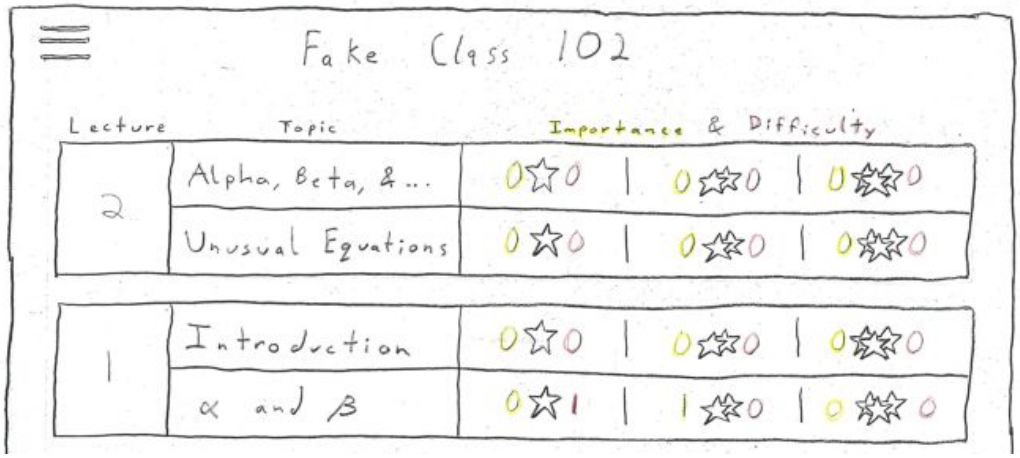
Option A: Importance/Difficulty and Star Headers



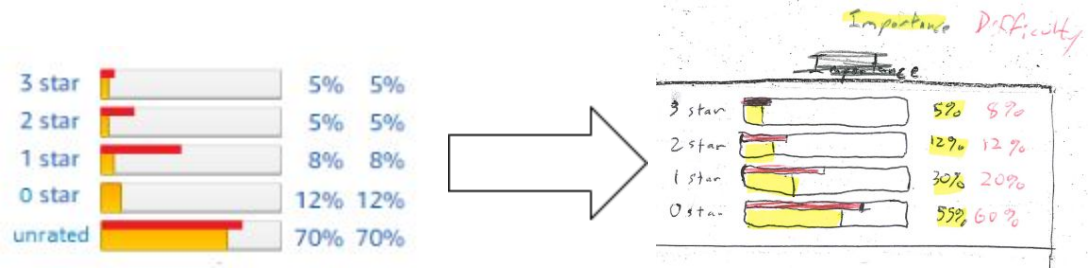
Proposed Fix: Minimize number of stars and color-code differences.

Option B: Stars on Each Line

With this feedback, we altered the design to have stars on each line, using them in place of the "/" dividers. We thought it might be nice to make the star dividers a little smaller in the future, and considered possibly adding stars together to give a total count of importance and of difficulty, although this would give significantly less granularity of topic difficulty, as slides may have an unequal number of topics.

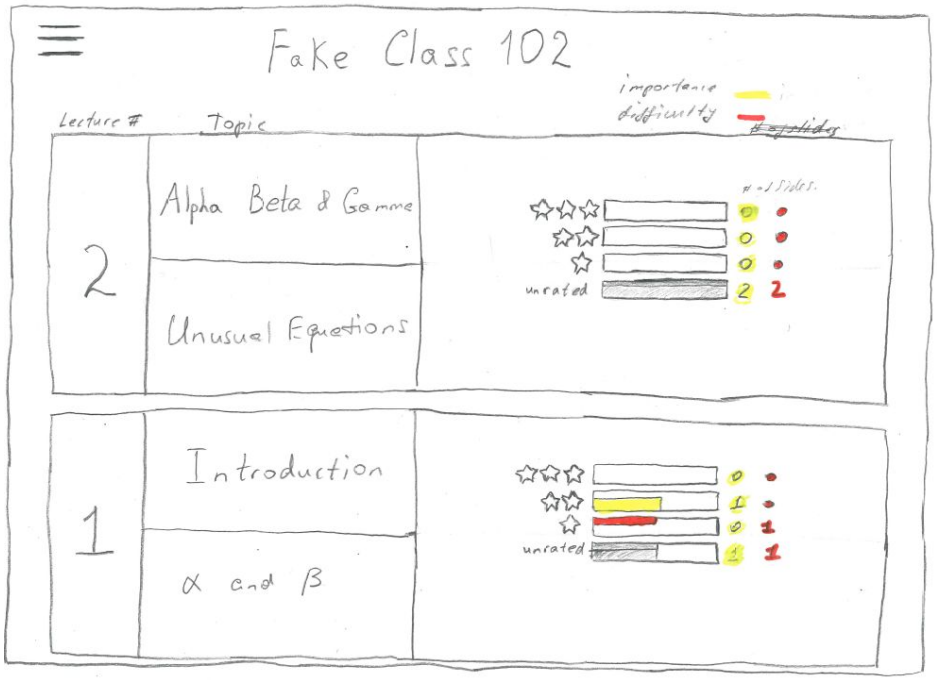


After receiving feedback from a crit, we considered existing design patterns, discussed our findings, and decided to try the following rating style for each topic. This rating combined both Importance and Difficulty with the percentage slides with each number of stars.



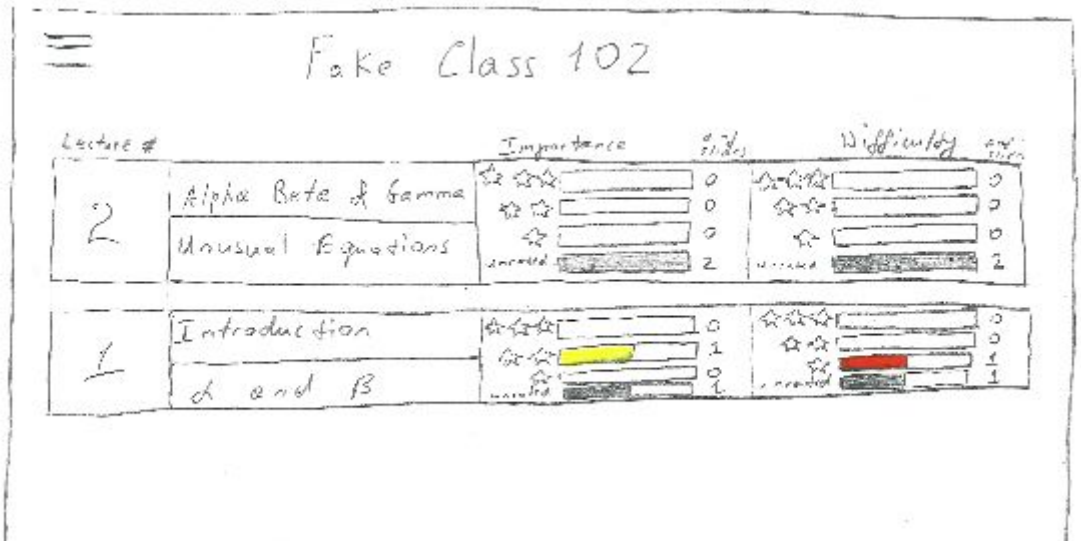
Severity 1

Our second participant stated that percentages next to each star made him think they were related to the whole class instead of just his ratings. He also suggested giving counts of slides with the number of stars instead. Our team agreed with the suggestion to use counts, and also decided to have the ratings for the whole lecture instead of separate topics to make it clearer and easier to read. These changes were applied before the third usability test later that day.



Severity 1

The third participant could successfully read the importance and difficulty levels, but found processing the data on a single chart overly difficult. The participant liked the general layout, but suggested having importance and difficulty in different charts, which led to the following final iteration.



Pop-up help tips

Severity: 3

Our second participant had a hard time submitting questions. He first tapped on the question mark icon but nothing happened. He then opened the user guide, which allowed him to proceed, but stated he would like some type of contextual feedback and suggestion instead of no action or feedback when tapping the question mark. Additionally, after adding a question, he was not sure whether the question was actually submitted. We made some changes covered in the Question-asking Mechanism section above, but additionally added pop-up tips to give feedback on interactions. When a user taps the question mark icon, a tooltip now pops up instructing “Drag me to your question.” Additionally, a toast notification appears after successful question submission.

Royden Luckey, Andrii Sagaidak, Samuel San Nicolas, Trevor Shibley
CSE 440 AA - Assignment 3f: Final Report
StudyQ

Final Paper Prototype:

Overview:

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StudyQ

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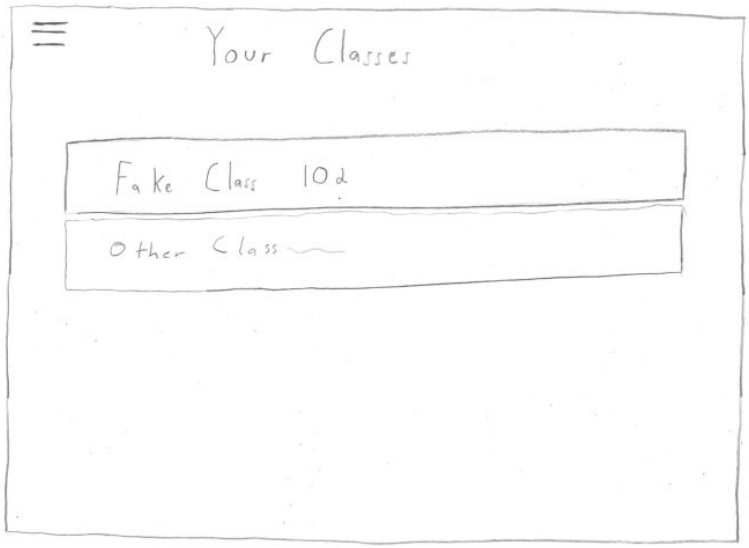
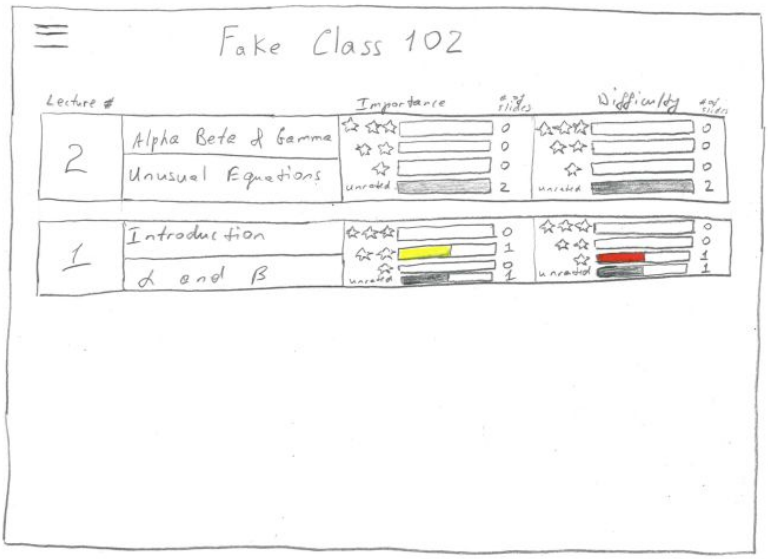
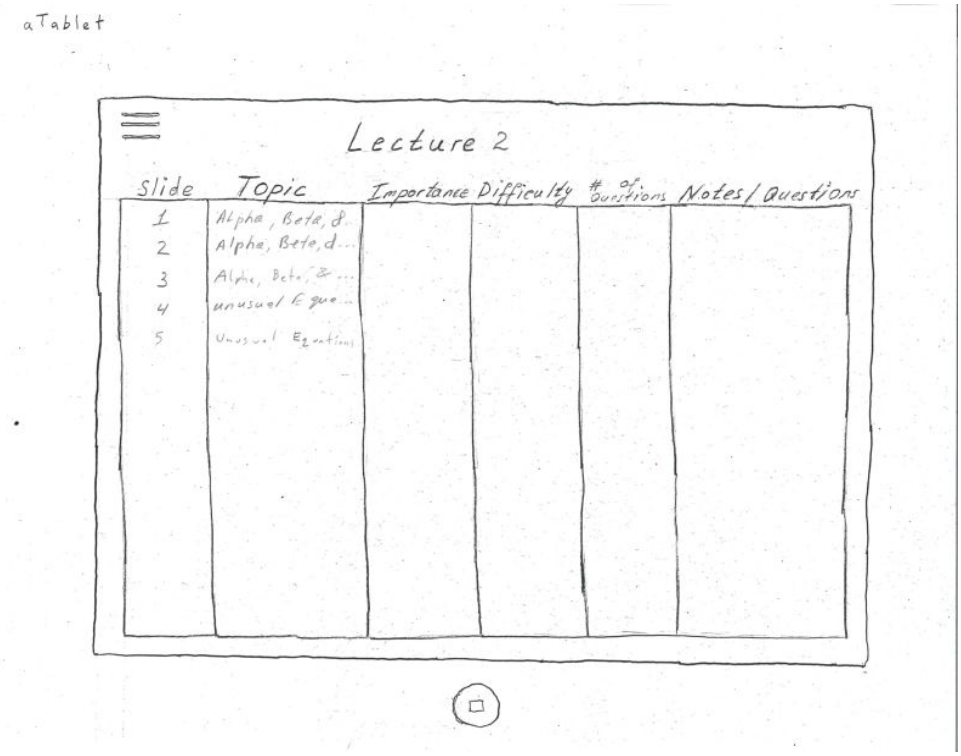
CSE 440 AA - Assignment 3f: Final Report
StudyQ



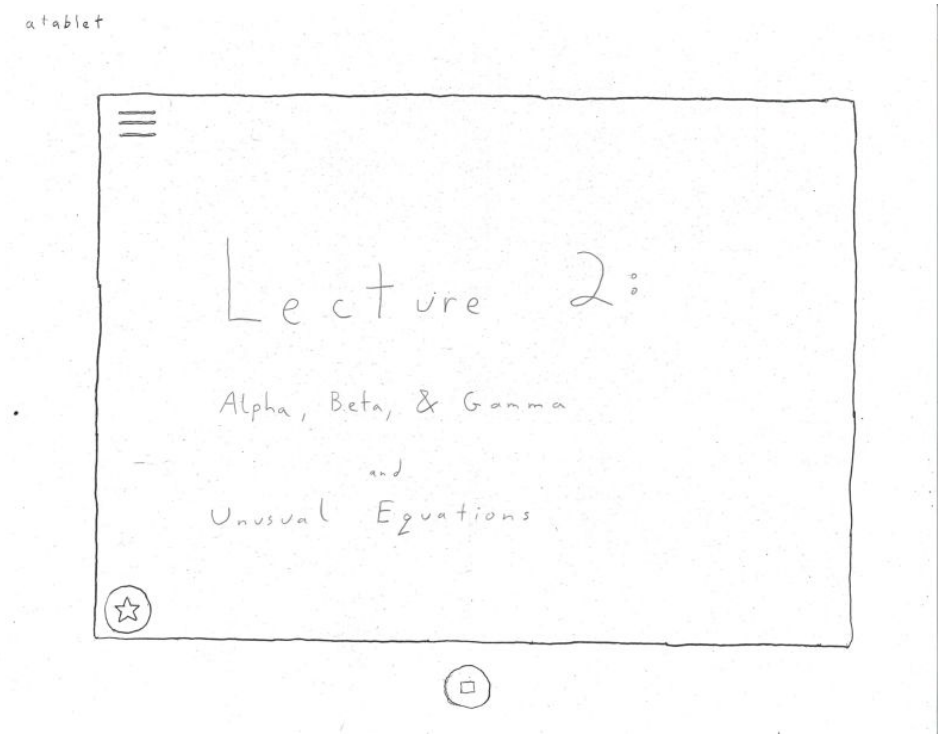
Home page: list of classes a student is enrolled in.



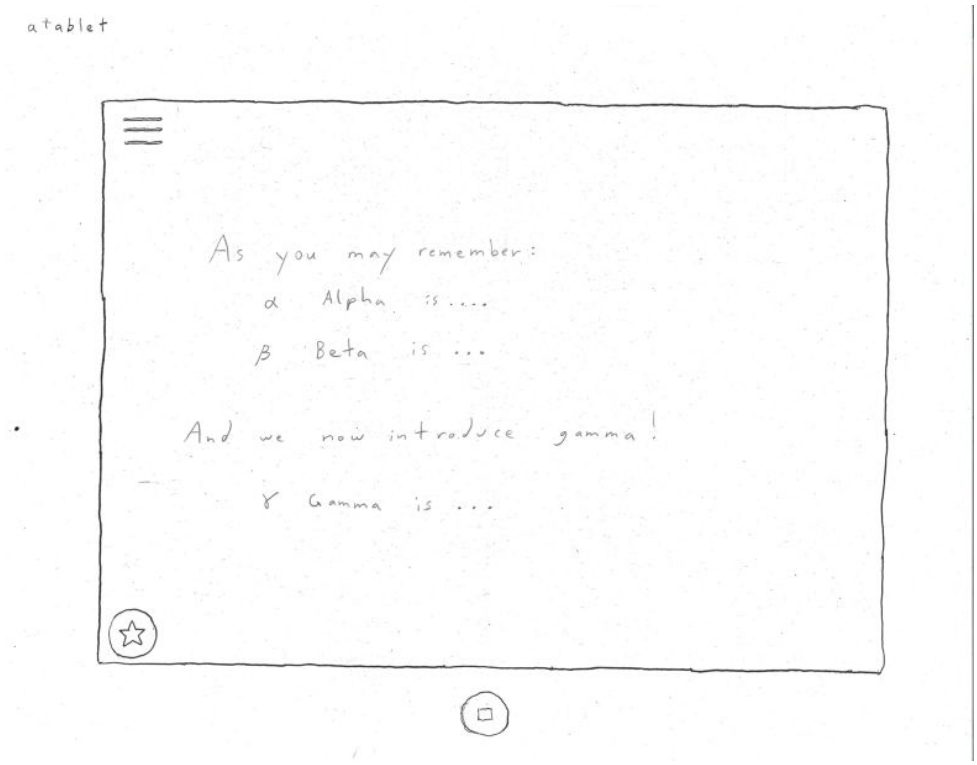
List of lectures for the chosen class:
Each lecture includes topics it covers and statistics on previously rated lectures by the same student



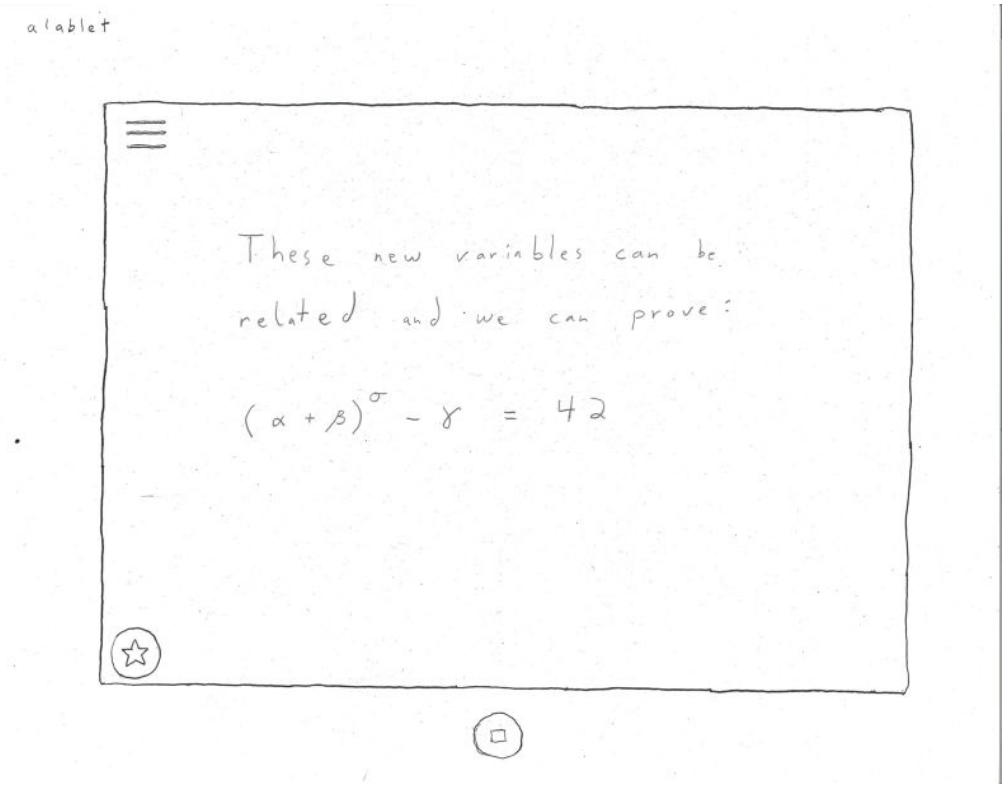
List of slides for a chosen new lecture

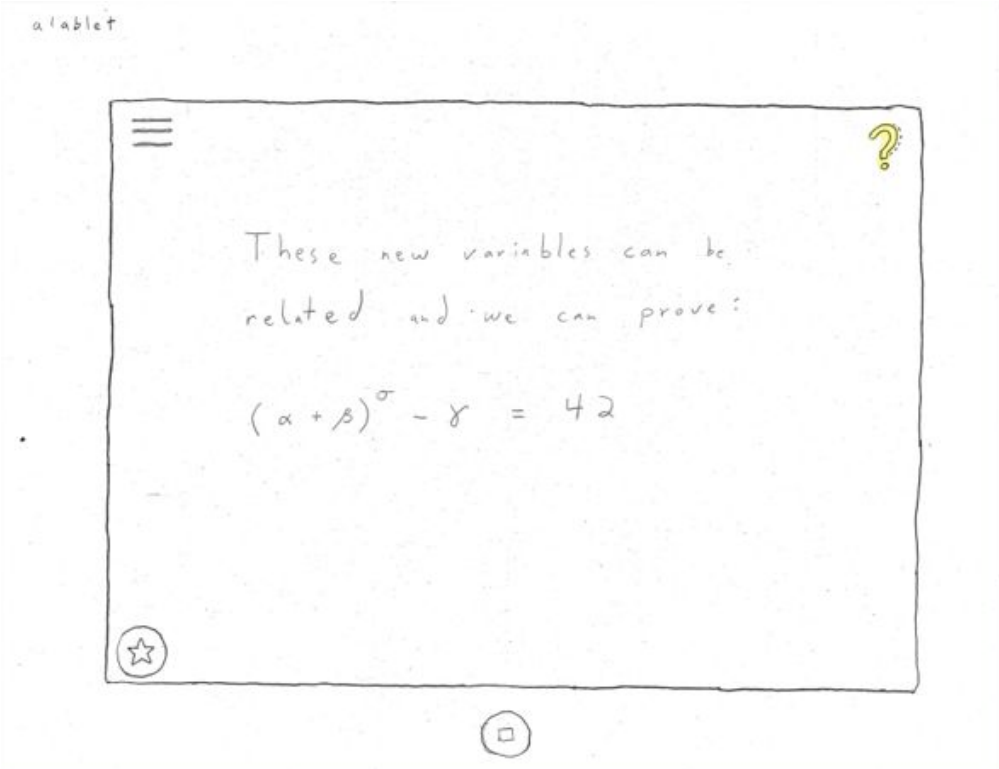


The student can click on a slide from the lecture, and it will open full screen.

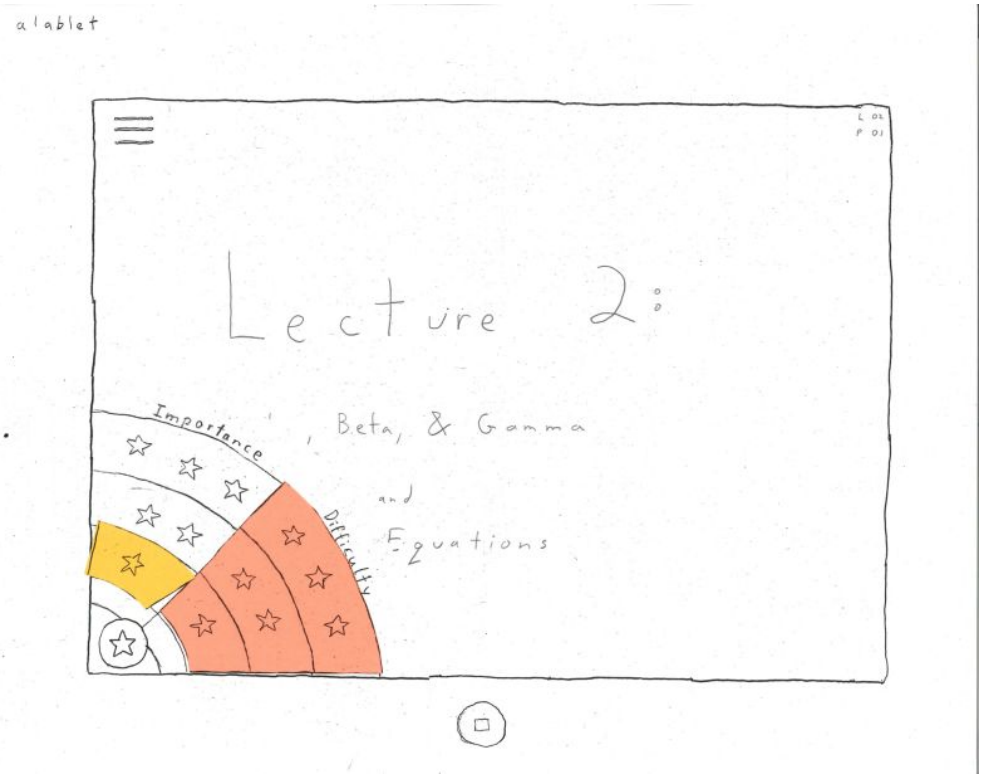


The student can follow along through the lecture slides with the TA

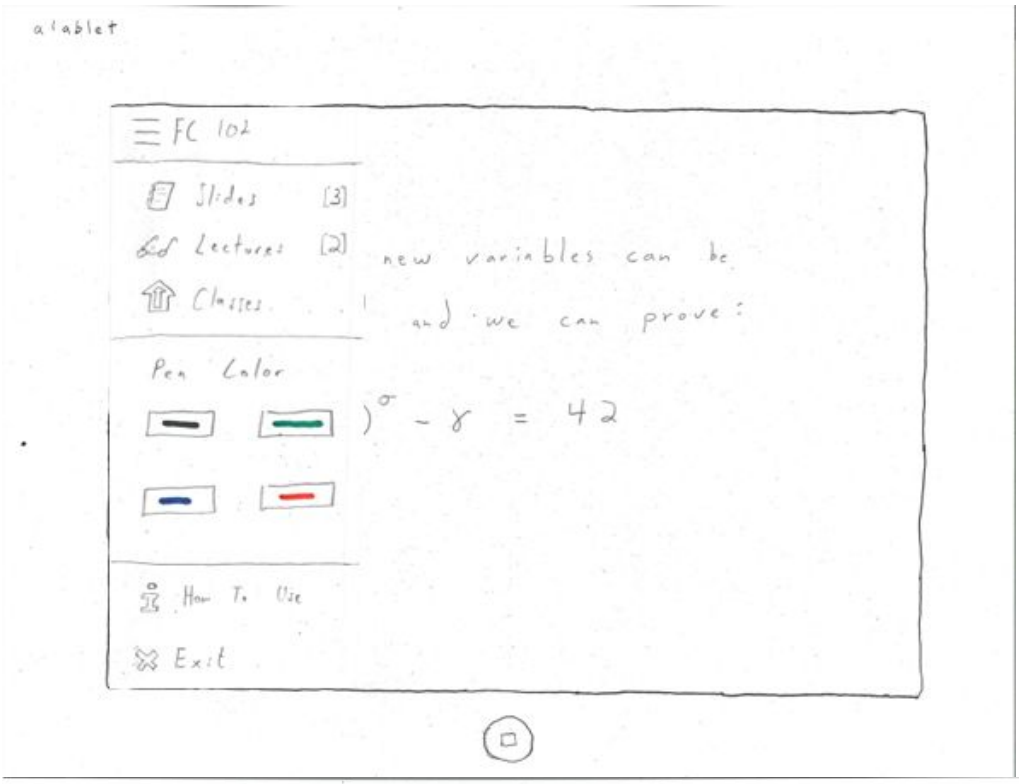




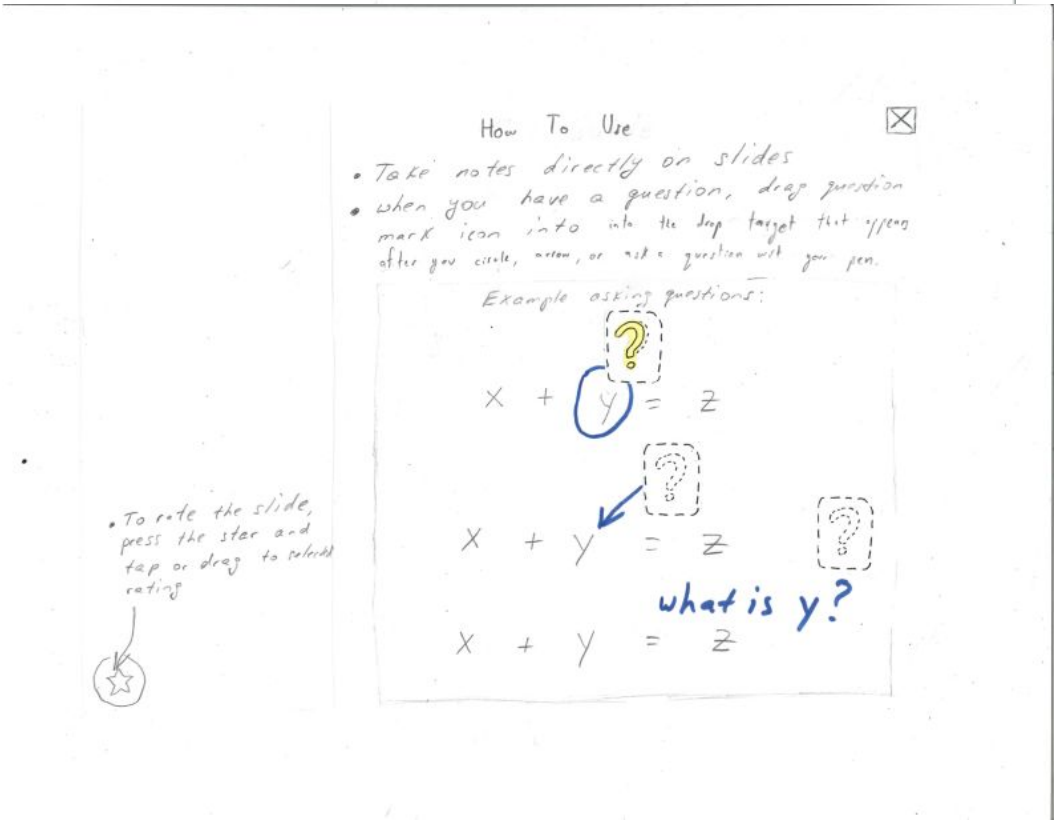
The student can ask a question, by dragging the question mark icon to the written question



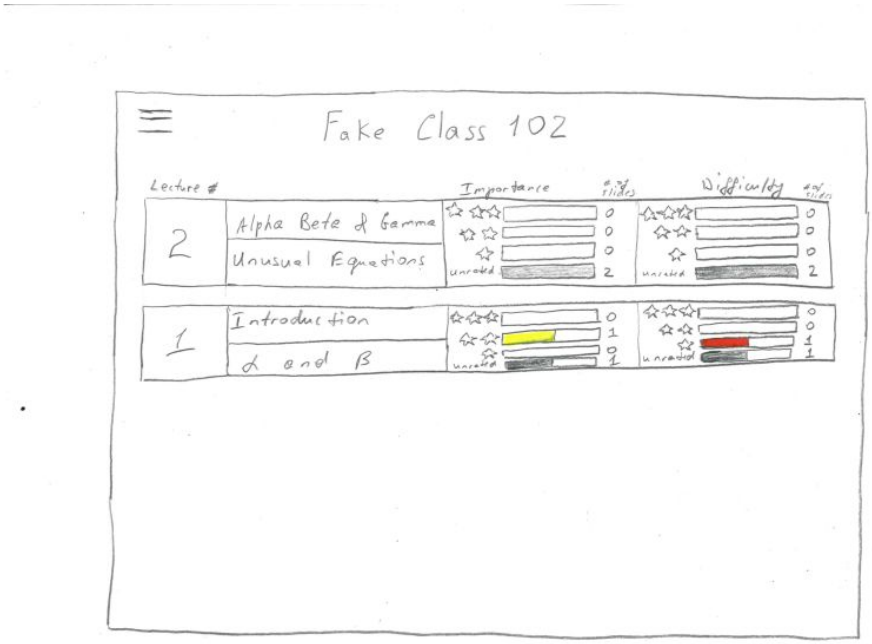
He can also rate a particular slide on importance and difficulty



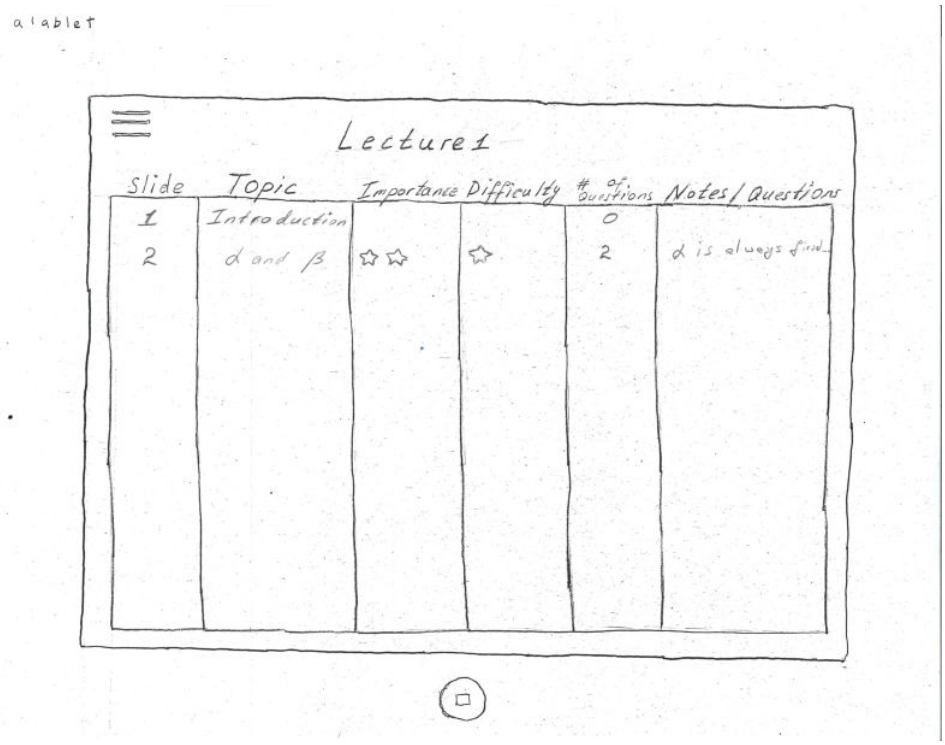
The menu



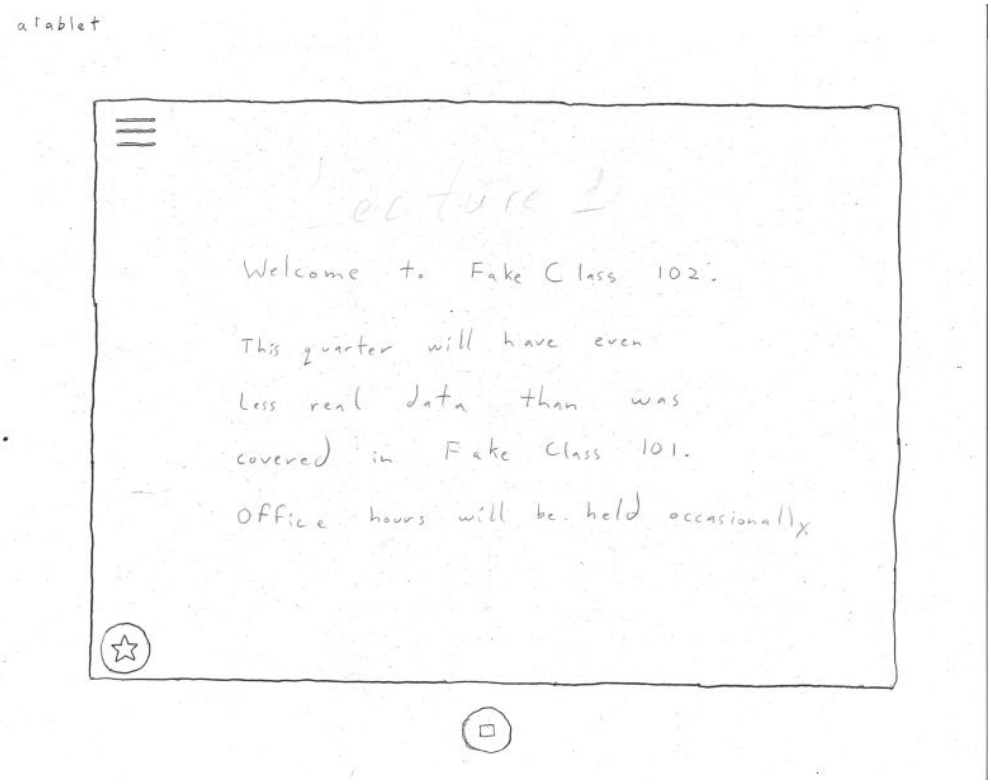
When the students first open the app, or any other time they click the help button on menu, a help screen comes up that explains how to use the app

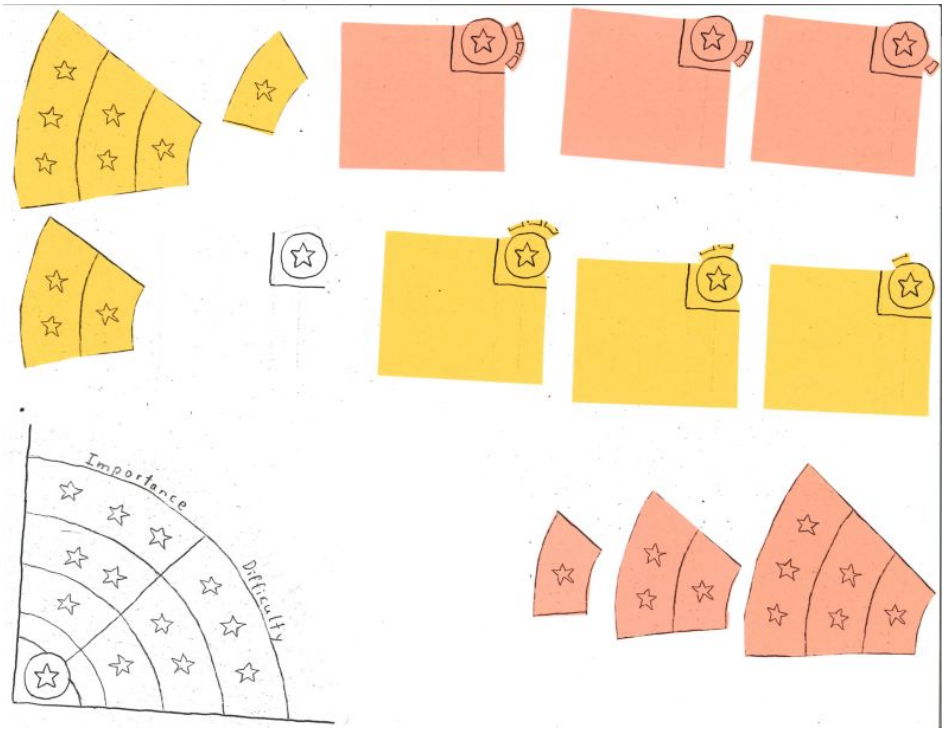


When the student goes to study the material from class later they can can view how difficult and important material was, and use that to guide their studying



Students can also view the importance and difficulty of each slide as well as its notes/questions





Digital Mockup:

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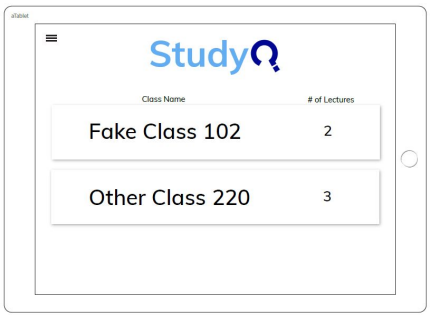

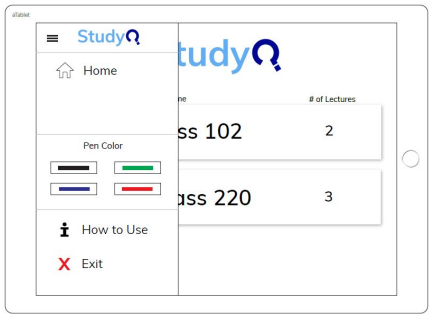

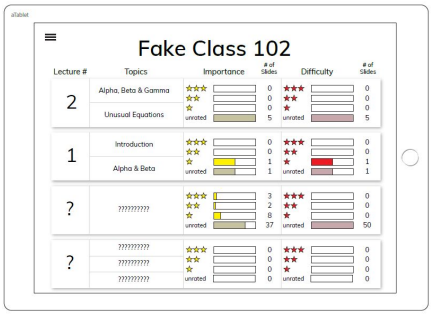

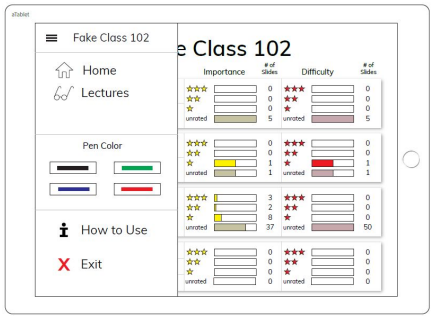

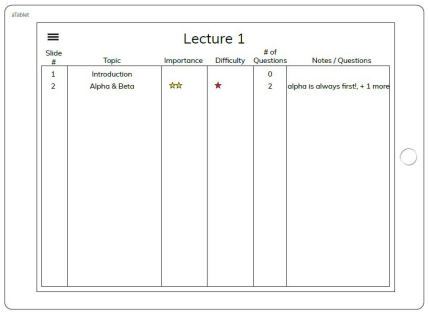

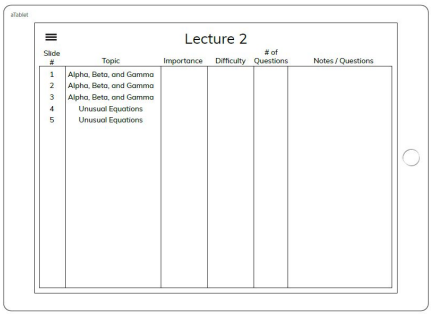

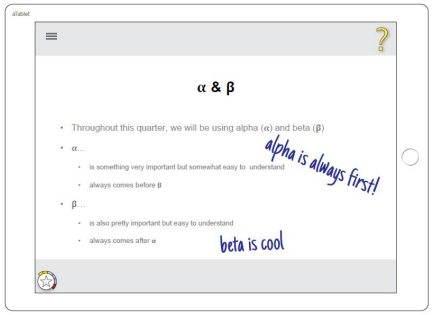

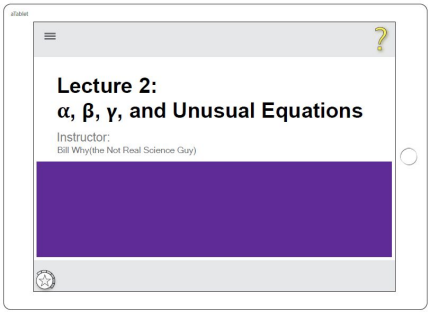

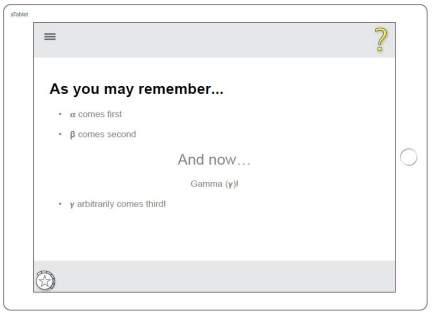

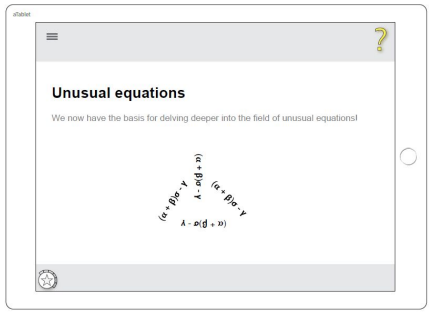

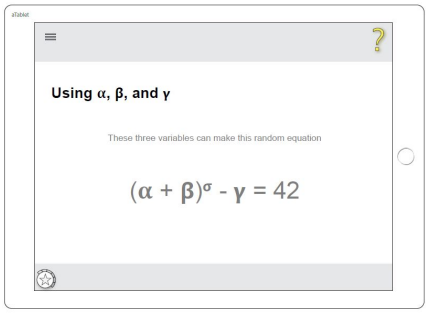

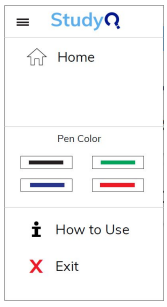

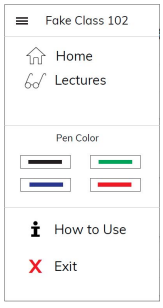

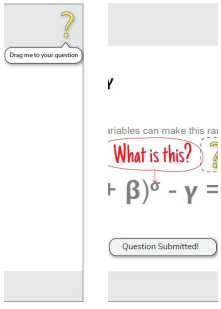

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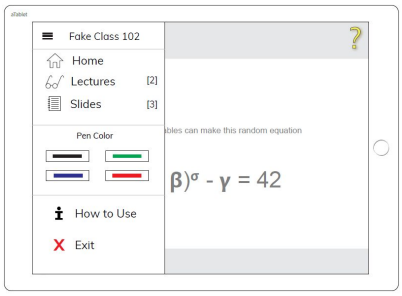
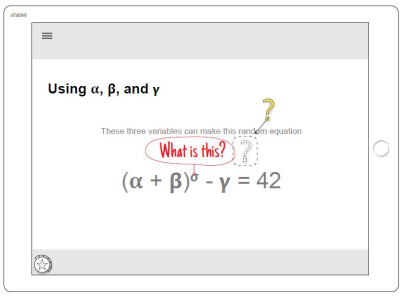
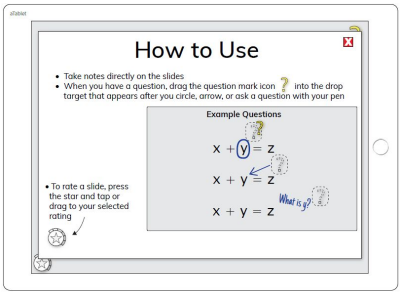
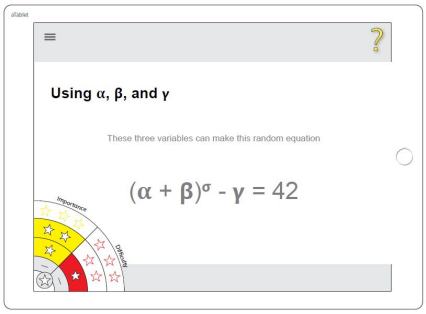
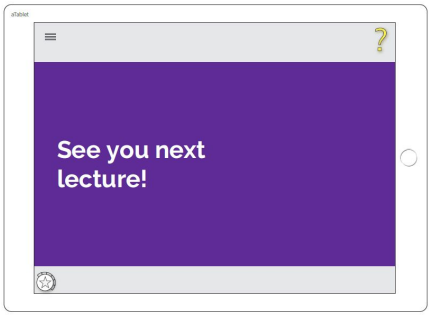
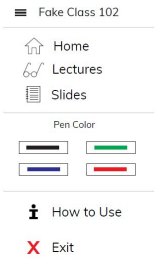






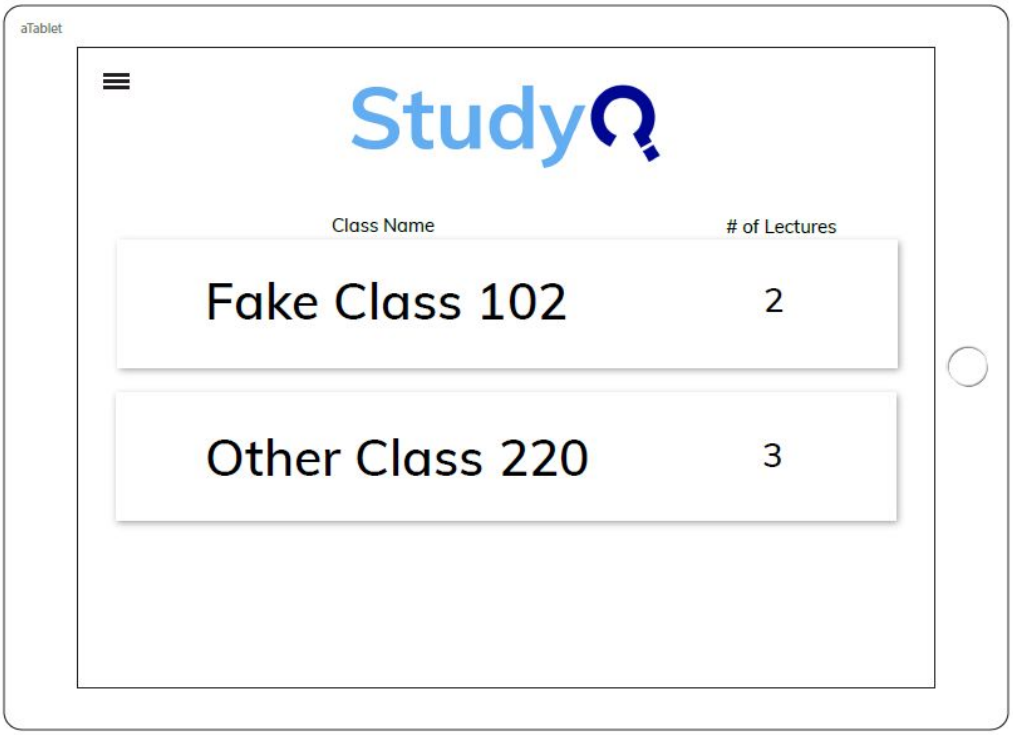






Task 1: In-Class Community-Driven Questions

Home Page: Tap on Fake Class 102 to see lectures for that class.



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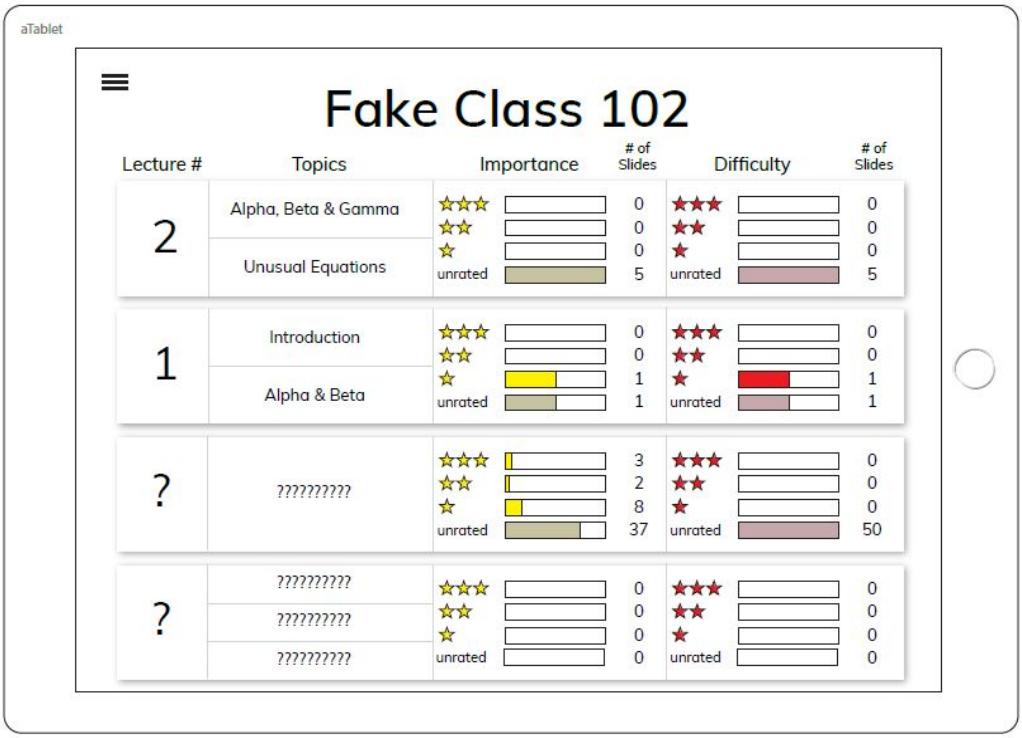
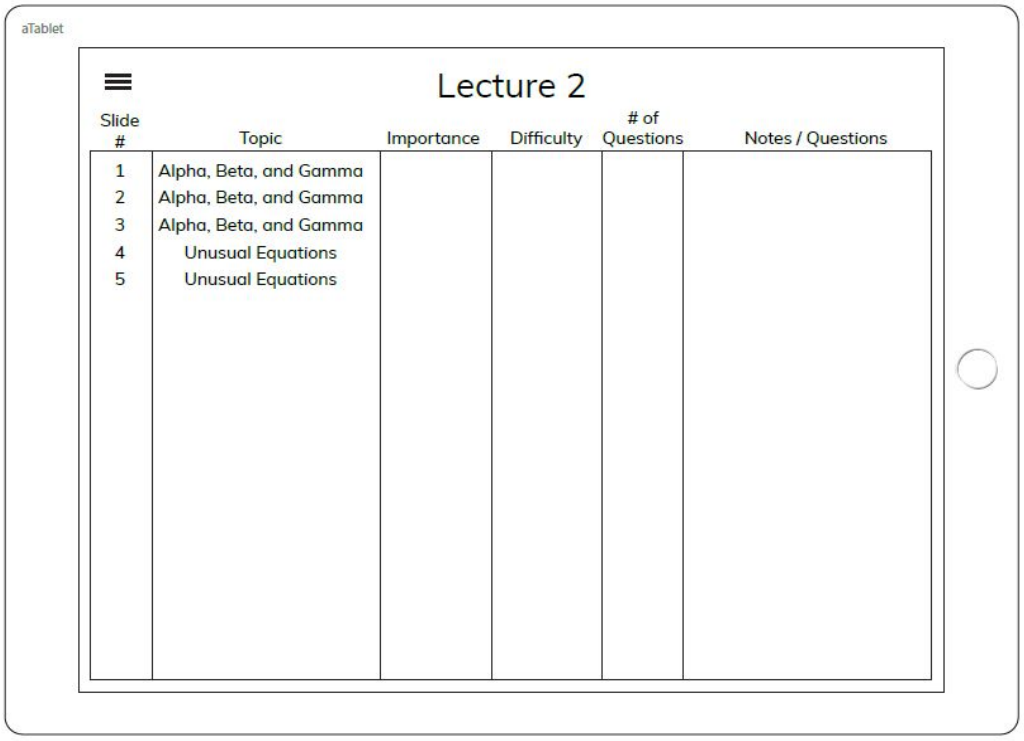
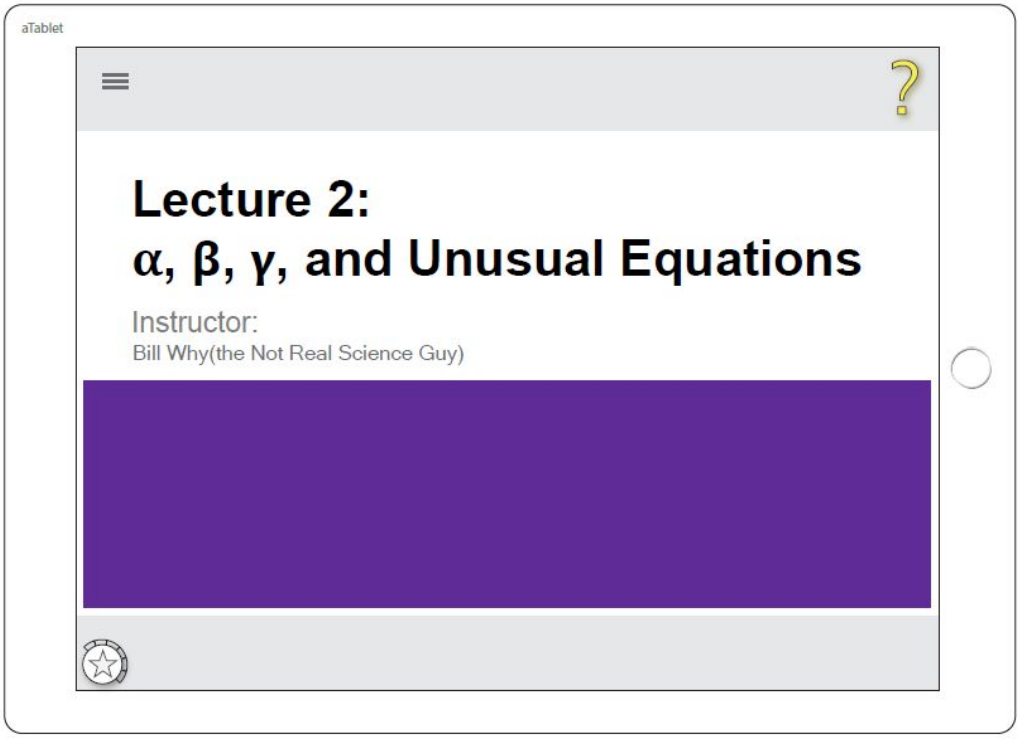
Lectures List: Tap on the current Lecture 2 to see a list of slides for that lecture.



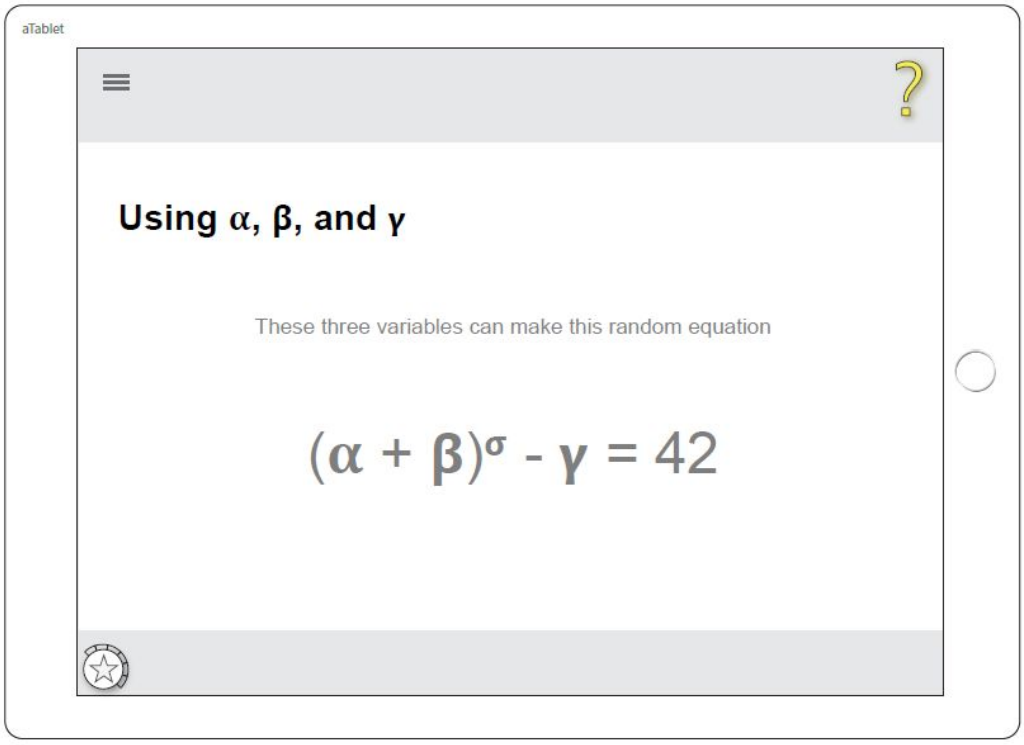
Slides List: Tap anywhere on the Slide 1 line to open the slides document at the first slide.



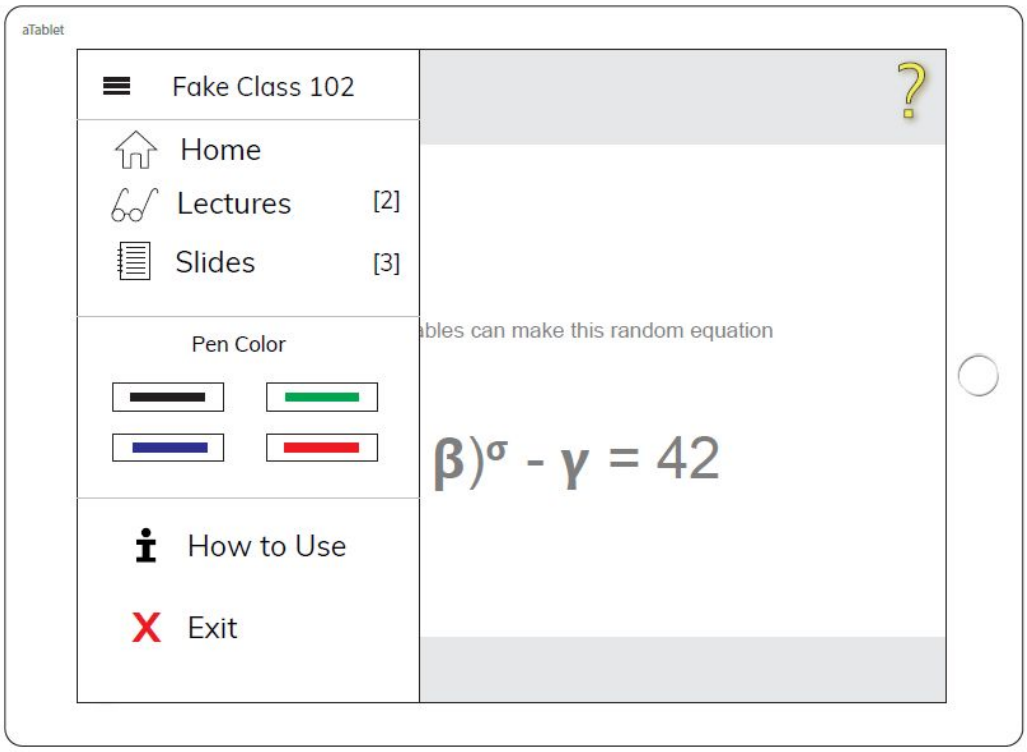
Example Slides: Currently on the first slide of lecture two.



Go to the next slide using swipe (hidden affordance standard for major tablet brand and apps).



Menu: Tap web convention hamburger icon for menu. Use the menu to quickly navigate screens, change pen color, ask for instructions, or exit. Tap menu icon, or anywhere outside menu, to close.



User Guide: Select “How to Use” from menu.

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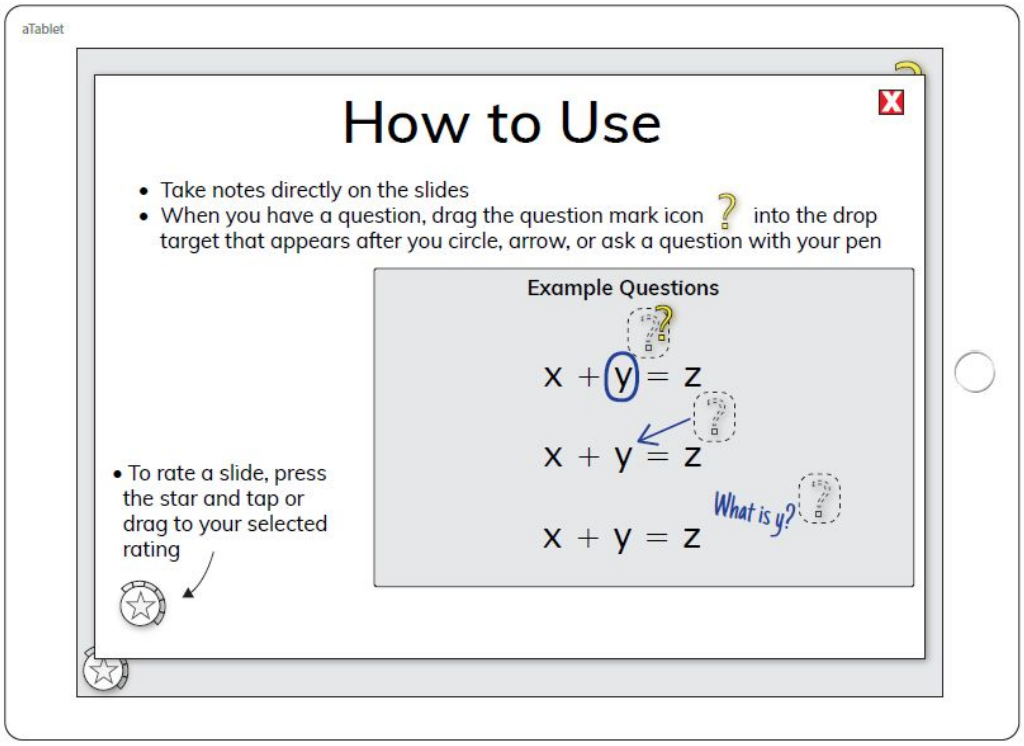
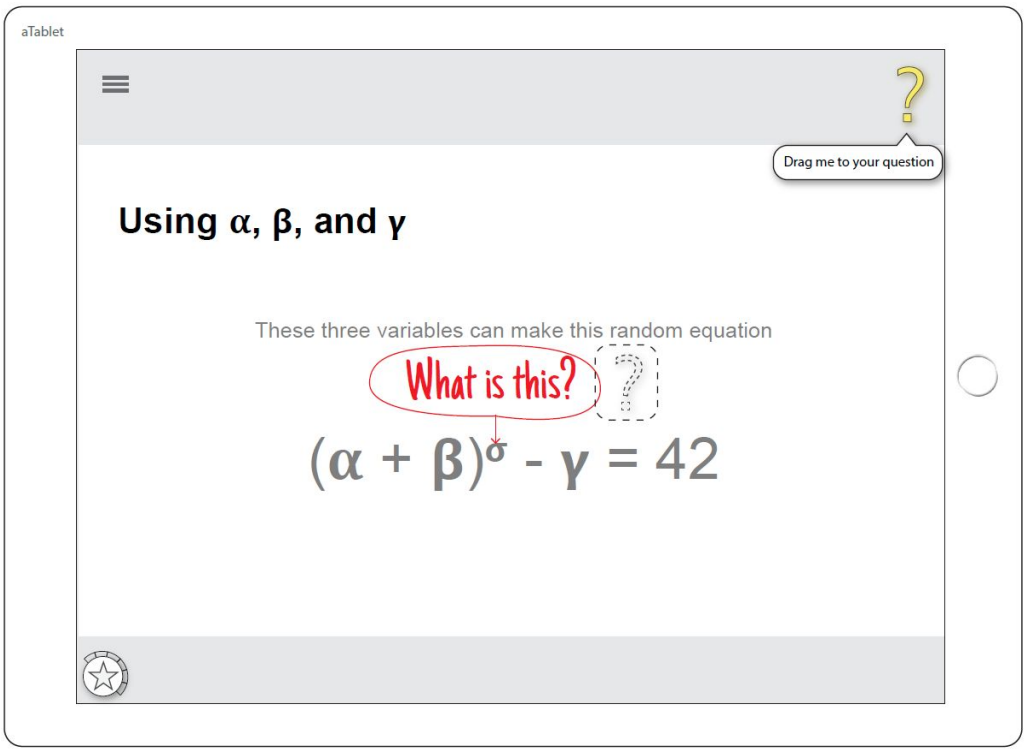
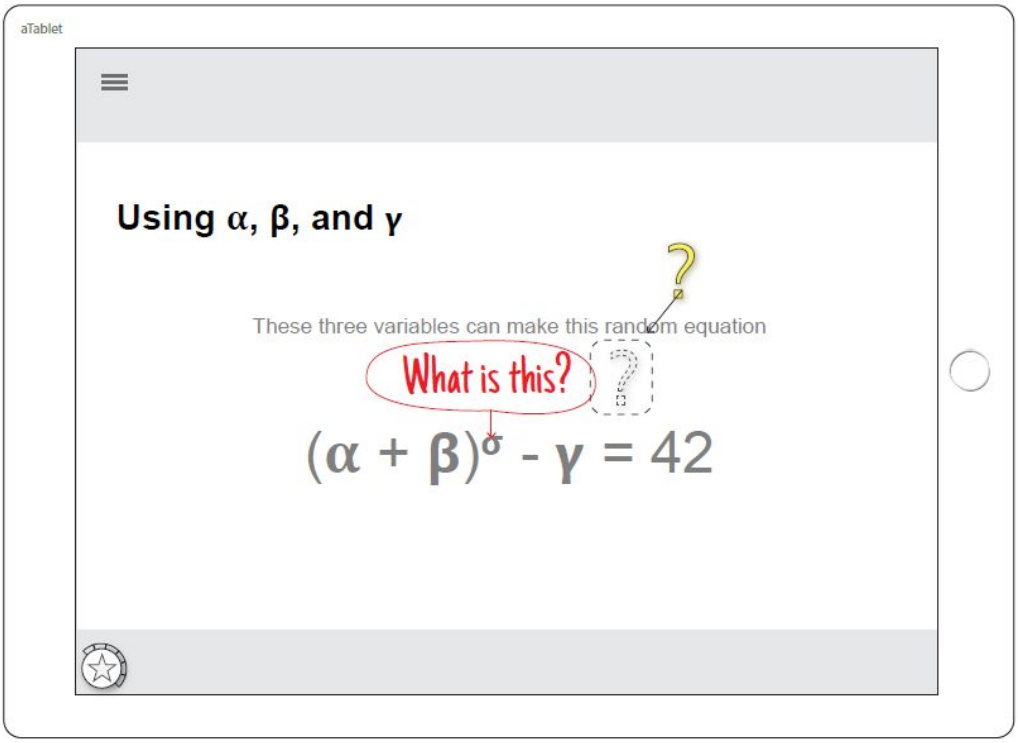


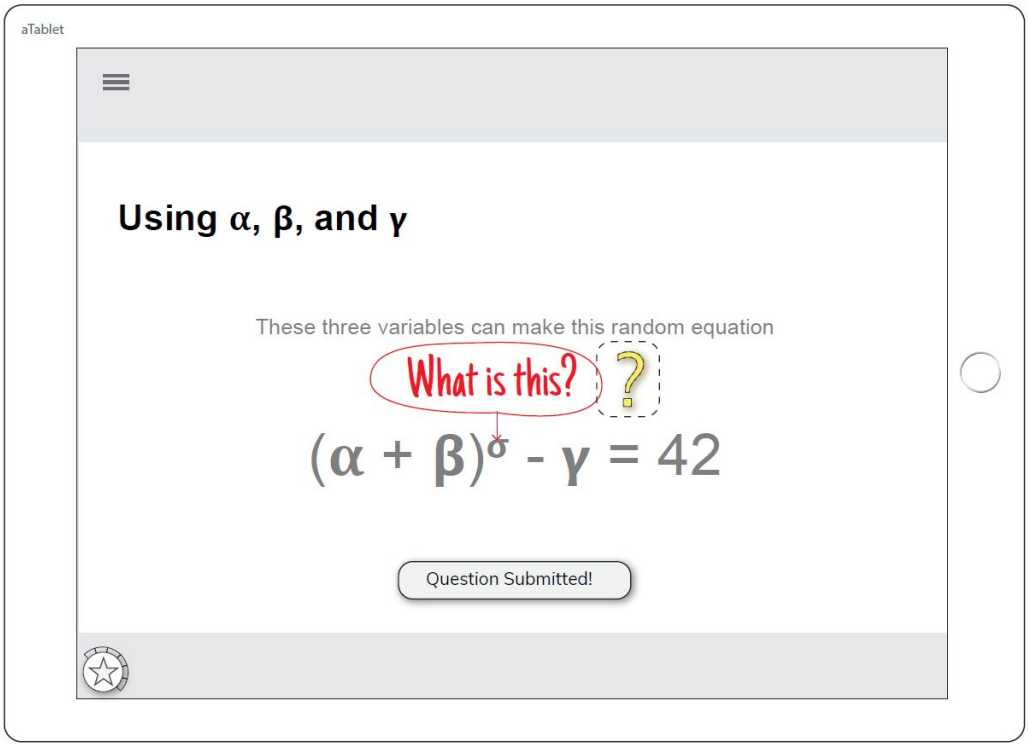
Ask Questions: If you tap the “?” icon, a message will pop up with usage suggestion.



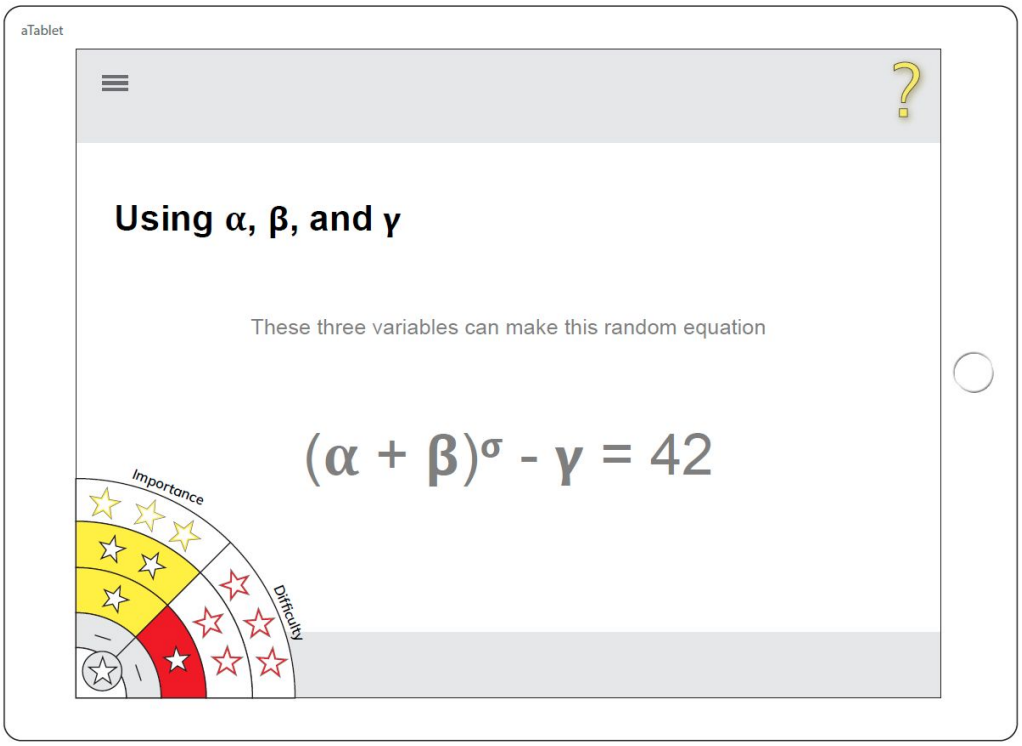
Ask Questions: Write question, arrow, or circle on slide and drag “?” icon to it.



Ask Questions: When you successfully drag-and-drop the “?” icon, a success message appears.



Rate Slides: Tap the star icon to rate slides by importance and difficulty.

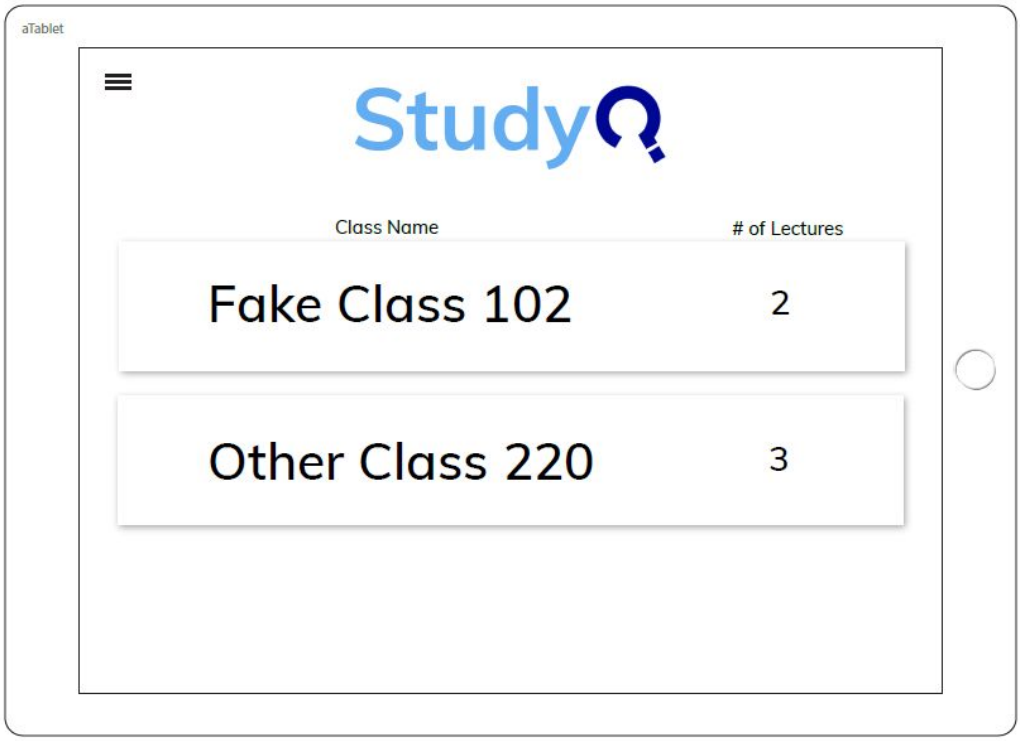


Now that the student has rated slides and asked questions, we can demonstrate more effective studying using their generated data.

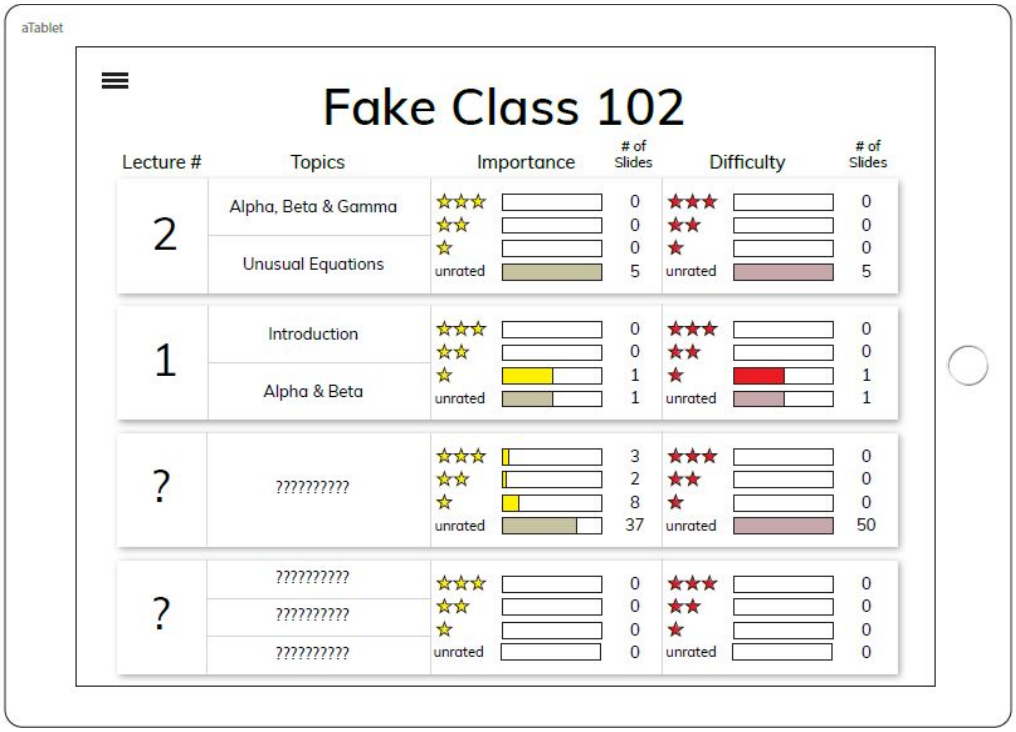
The student again starts out at the list of classes upon opening the application, but this time their attention is on different features as they utilize the design to accomplish studying rather than asking questions and taking notes.

Task 2: Data-Driven Studying

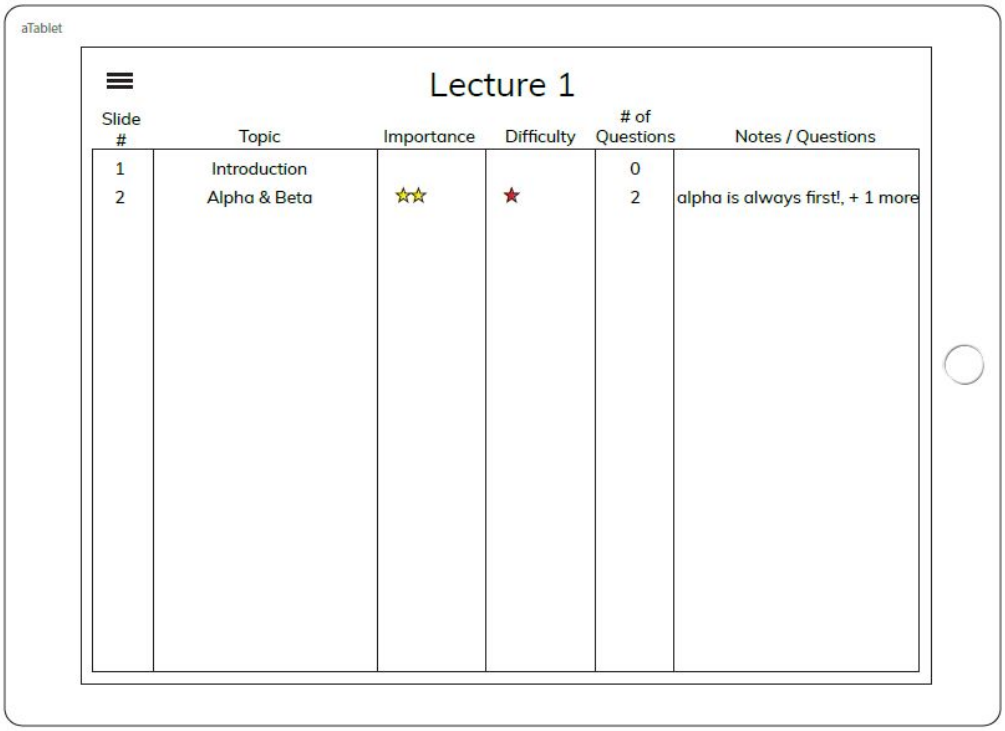
Home Page: Notice Fake Class 102 has a total of two lectures so far. Tap on it to see lectures.



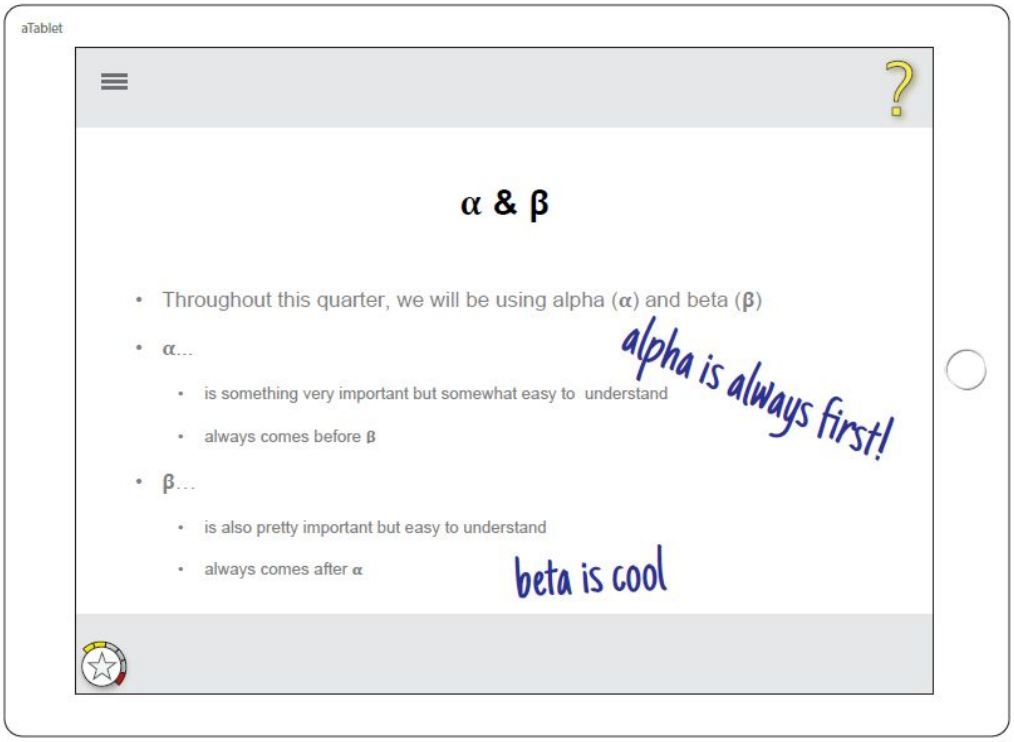
Lectures List: Each lecture displays the rated slides count. Tap lecture one to view rated slides.



Slides List: Every slide shows student assigned ratings, number of questions asked, and a brief summary of notes and questions written on that slide by the student.



Example Slides: Currently on the second slide of lecture one.



On the slides menu, we could see that this slide had a two-star importance rating, a one-star difficulty rating, and a summary of the questions and notes written on the slide by the student.

While studying, the student can choose to change the ratings and add to or edit the previous notes using the same actions they initially used to add ratings and notes. It is worth noting that the “digital pen” used to write on the slides includes an “digital eraser” on the back end for easy editing.

Additional Screens and Elements

There is a full, if brief, set of slides for the two lectures that participants can interact with. Additionally, the menu has some screen elements which change depending on available actions for the screen currently in view.

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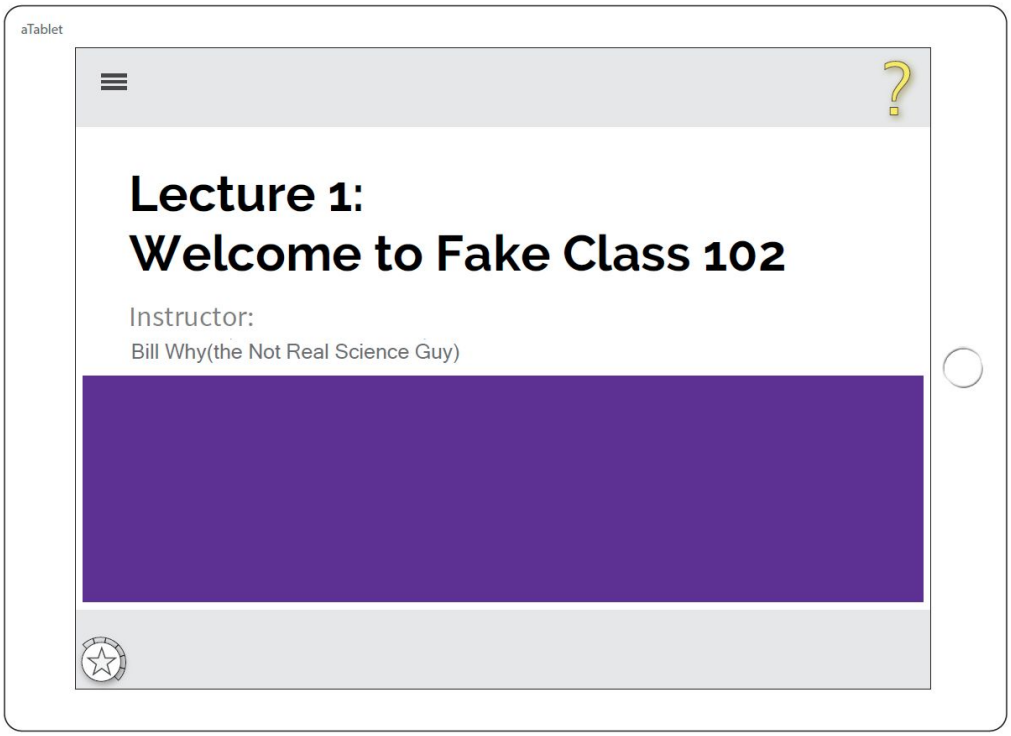
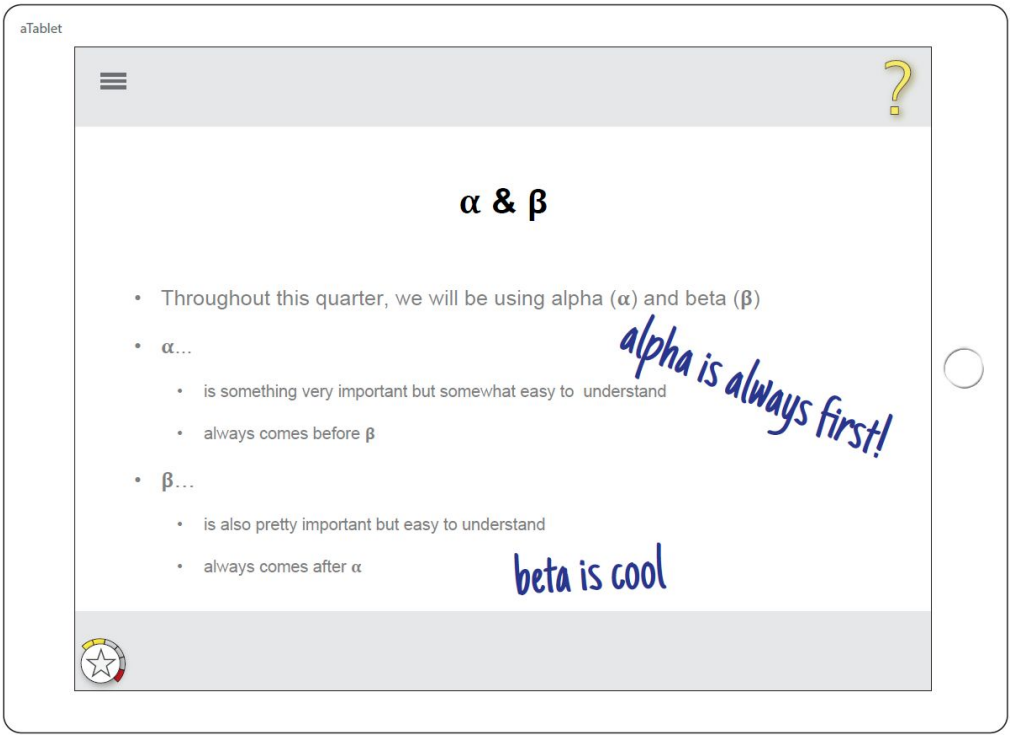
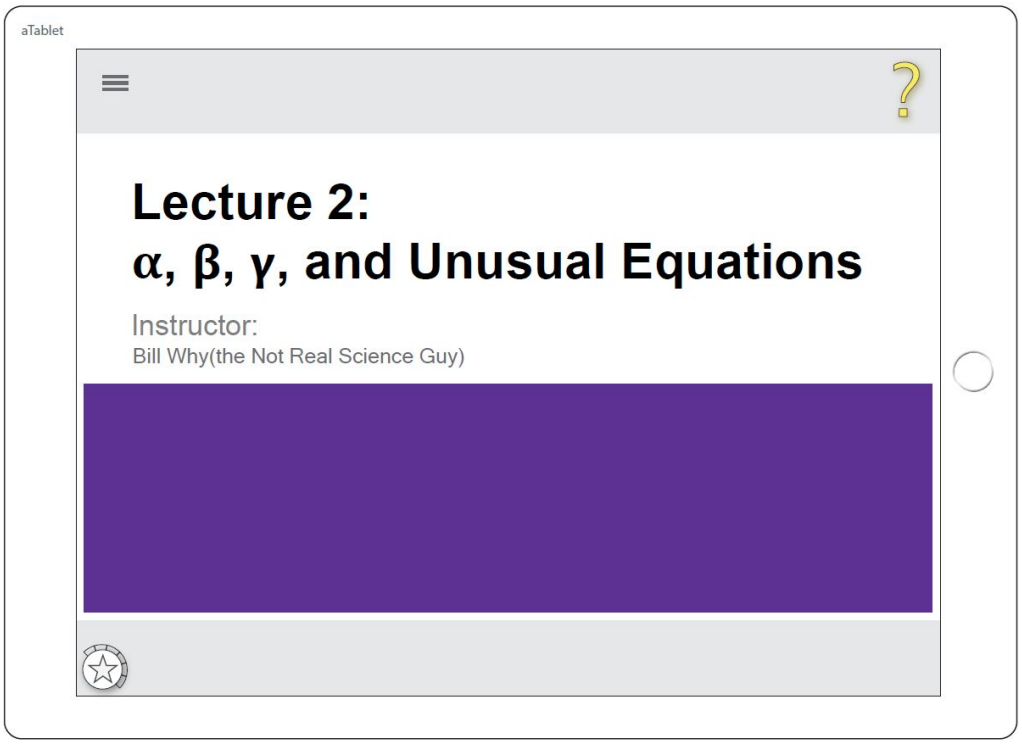
Lecture One: Slide one.



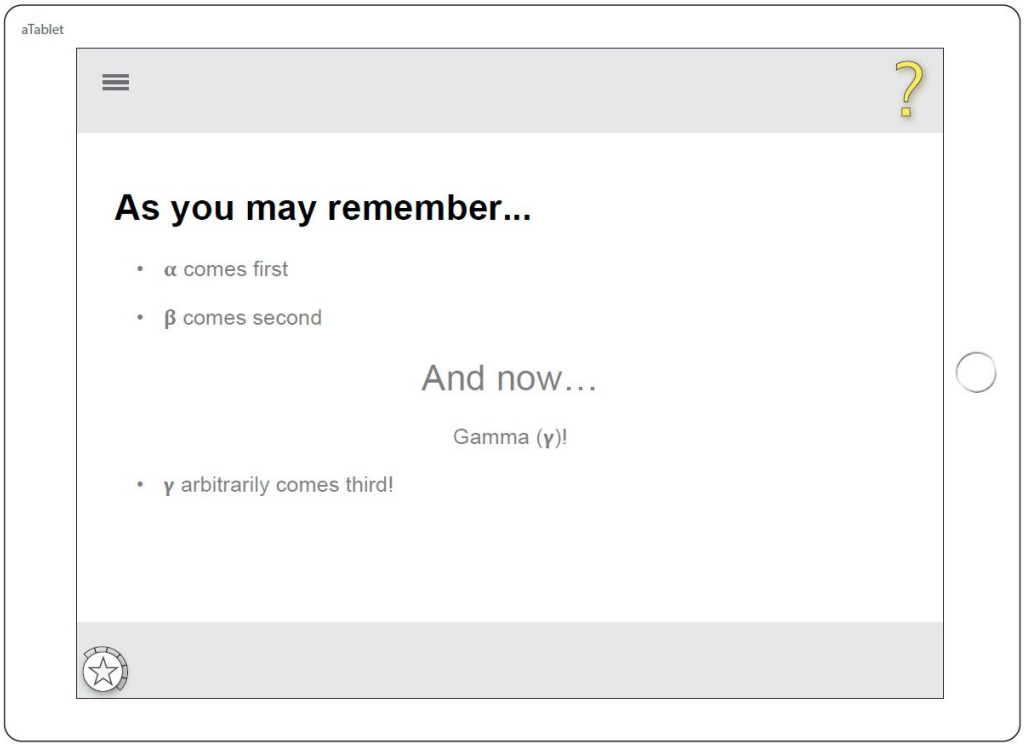
Lecture One: Slide two.



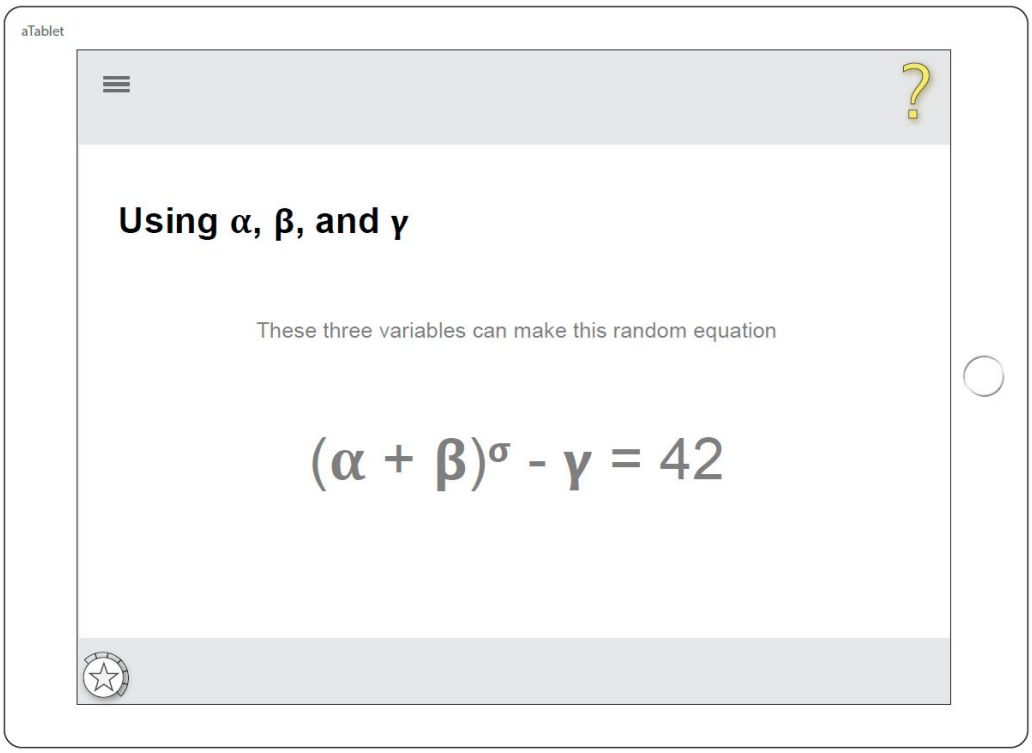
Lecture Two: Slide one.



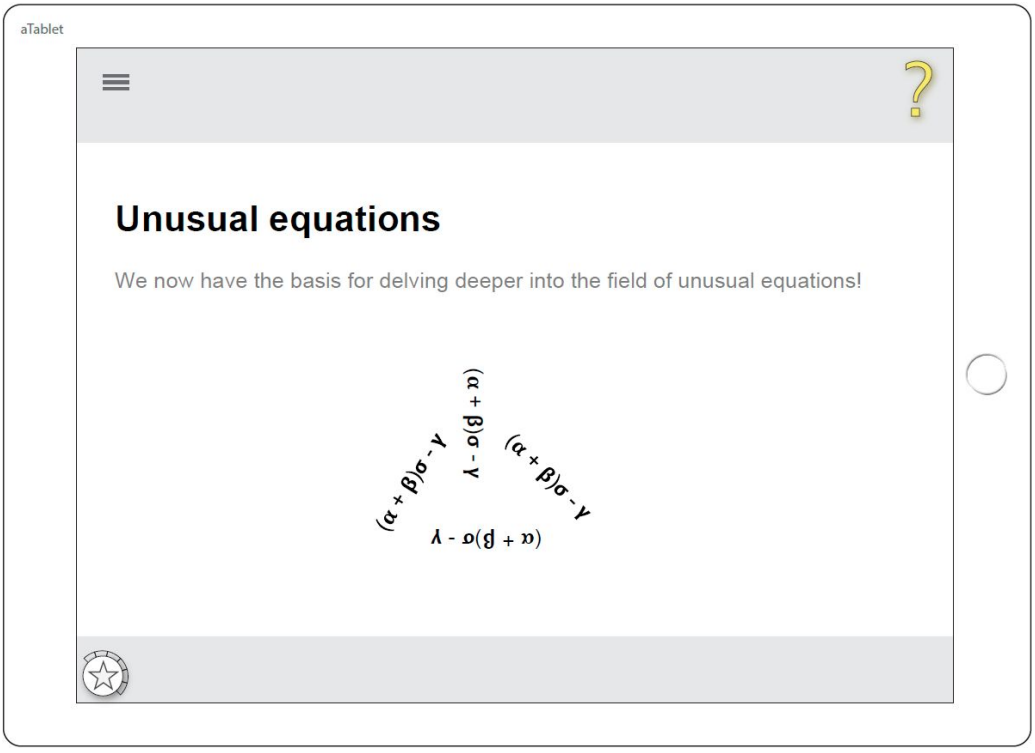
Lecture Two: Slide two.



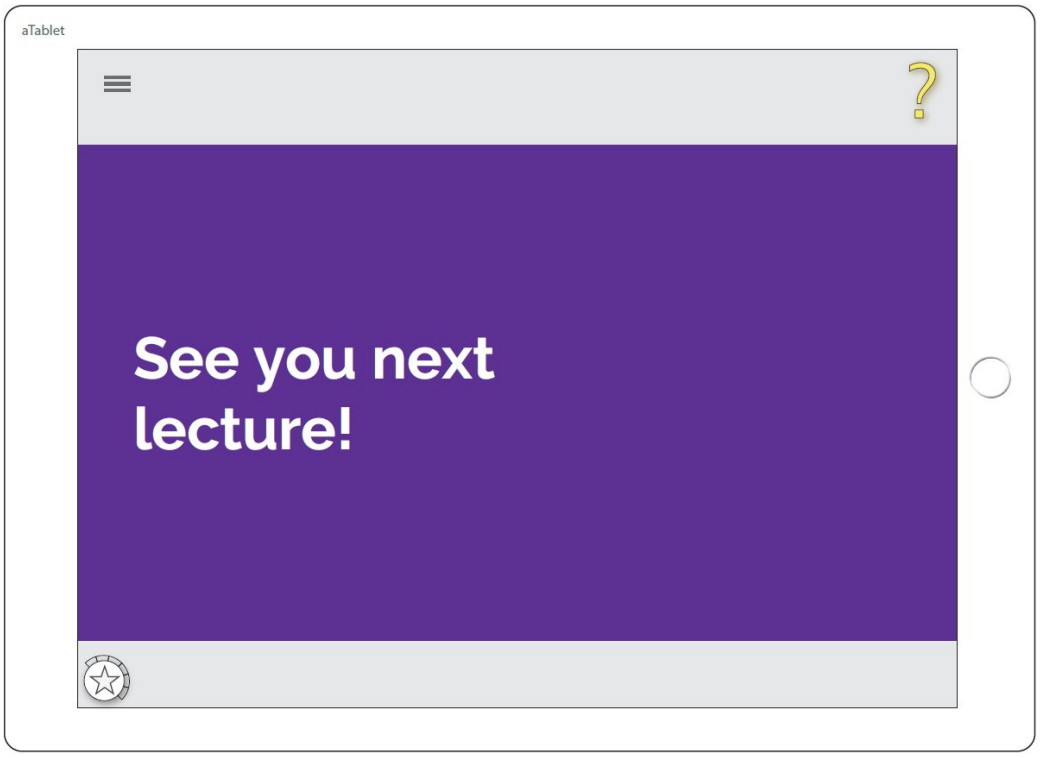
Lecture Two: Slide three.



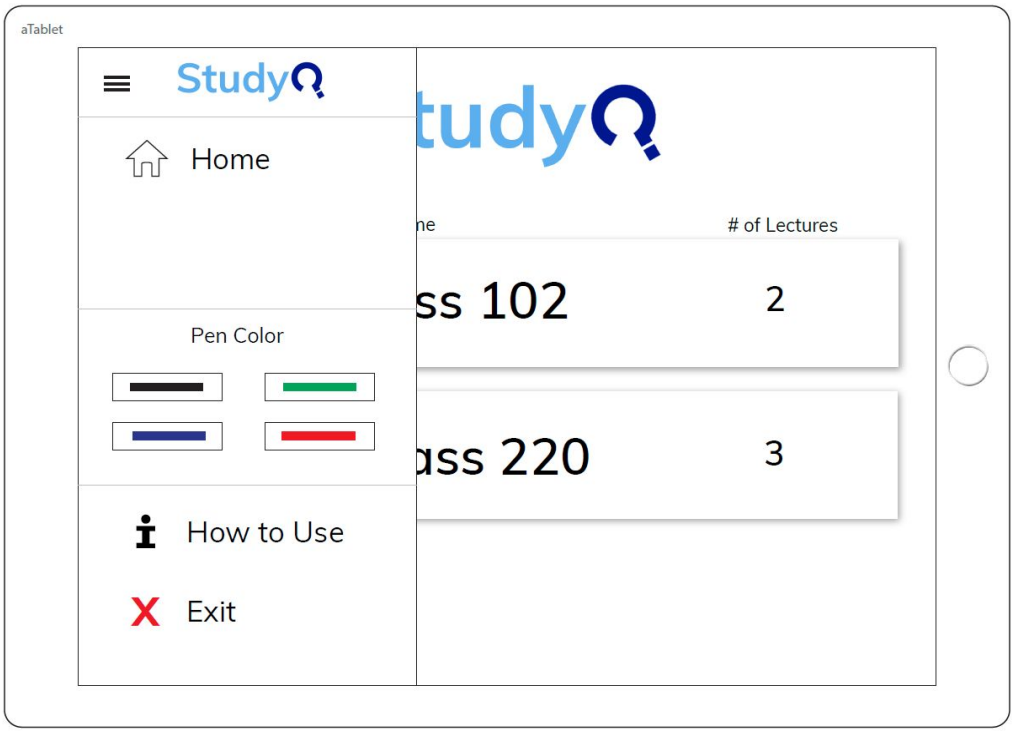
Lecture Two: Slide four.



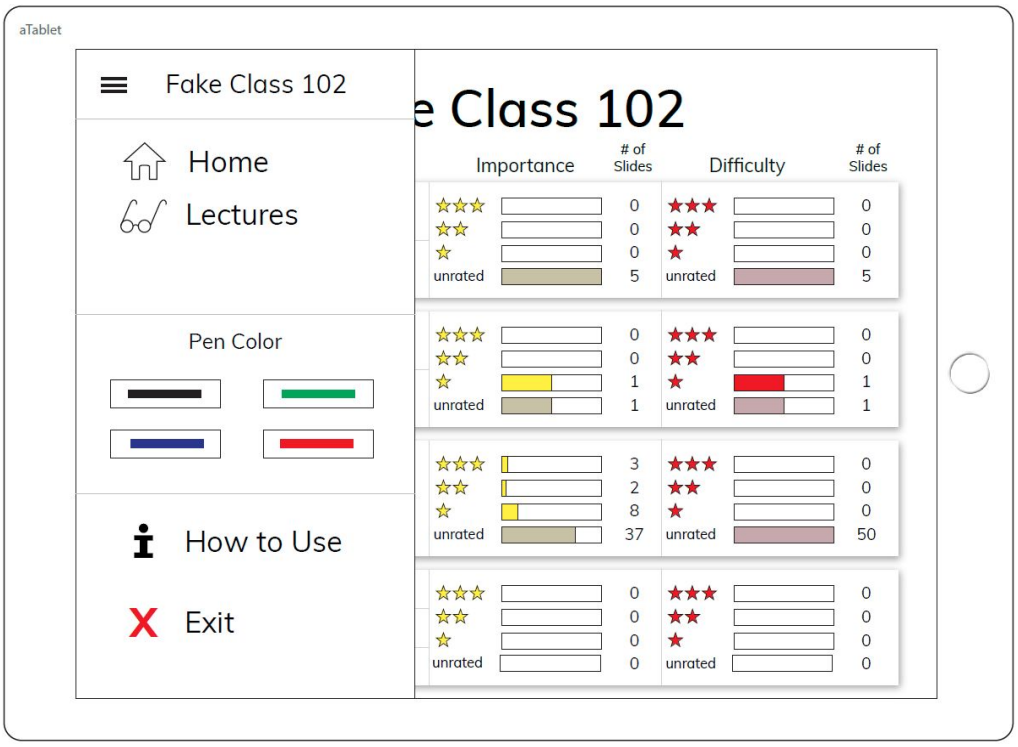
Lecture Two: Slide five.



Class List Menu: The lectures and slides options are not available until you choose a class.



Lecture List Menu: The slides option is not available until you choose a lecture.



Changes to Prototype as Digital Mockup

We made very few changes to our design while implementing the digital mockup. The most significant changes were coloring of stars and bars, which affected ratings menu, lectures list, and slides list, but even these colors were basically what we had described on the paper prototype. We also added a couple of additional fake lecture options to show more standard usage display of rating charts.

Discussion:

Throughout the iterative design process, we made many changes, both small and large, in response to feedback from participants and crits. The varied designs and changes during the “getting the right design” phase were often larger changes, but usually felt like definite improvements. During this phase, it was easier to change in more drastic ways, as suggestions sparked new ideas and everything was very rough sketches. This part of the iterative design process changed our design in major ways, affecting both the target user base and the supported tasks.

As we moved into the “getting the design right” stage, the changes were generally smaller, but often harder to come up with a good solution for. It was still important to keep the design rough

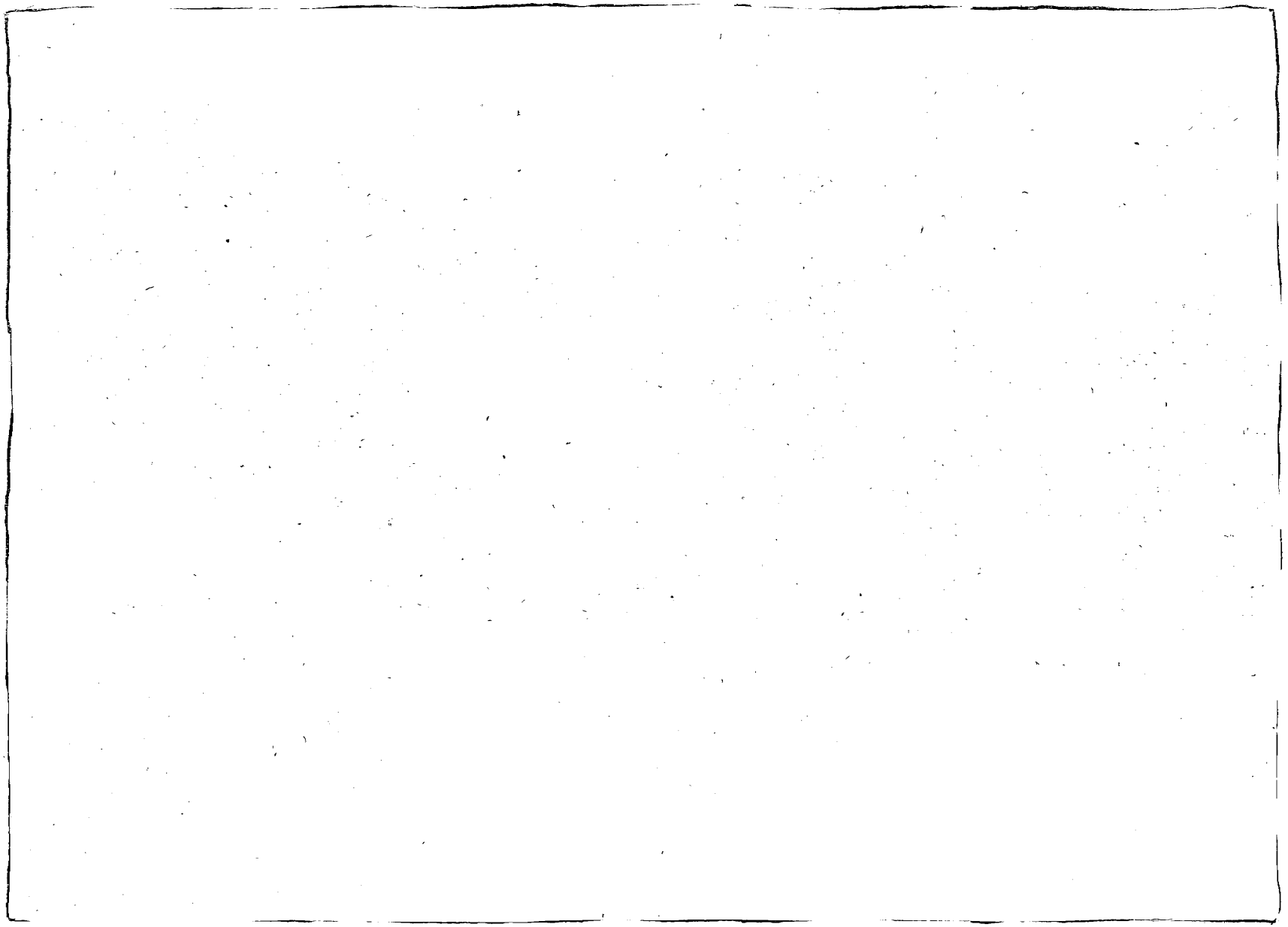
and quick though, as it was harder to justify a change that would require significantly more work and might not actually be an improvement. However, the freedom to adjust the design quickly between each evaluation or usability test was the only reason we were able to reach a reasonably good design in the end. After a participant identified a problem, we were able to try out a solution with the next participant, sometimes finding problems with the attempted solution, leading to the next iteration. Some areas we had not even suspected would be significant, while others were suspect to us, but we were uncertain if a general audience would feel the same way. The iterative process both let us determine how severe the issue was, and often led to great suggestions from the participants about what they would like to see instead. This part of the process did not change our basic tasks significantly, but impacted the interactions significantly. A few screens that gave particular problems were almost entirely changed multiple times.

We would have liked to do more iterations on our design, especially during the usability testing. We were still getting feedback from users during our last usability tests about areas they would like to see improvements. While we included changes to the last few problem areas in the final design, they were not tested with external users, and so could have introduced new flaws. Additionally, it would have been helpful to do more than one usability test between each iteration, especially when we proposed multiple possible solutions.

Appendix:

Appendix:
Paper Prototype v1

a Tablet



How To Use Study

- Take notes directly on the slide.
- When you have a question, add a "??" to the end of the note.

What is x??

→ Common questions will be automatically sent to the instructor.

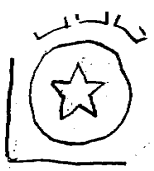
- Use the "☆" in the bottom left corner to rate the slide to aid with studying in the future.

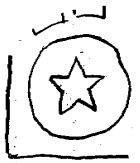
← FC 102

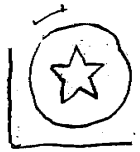
Home

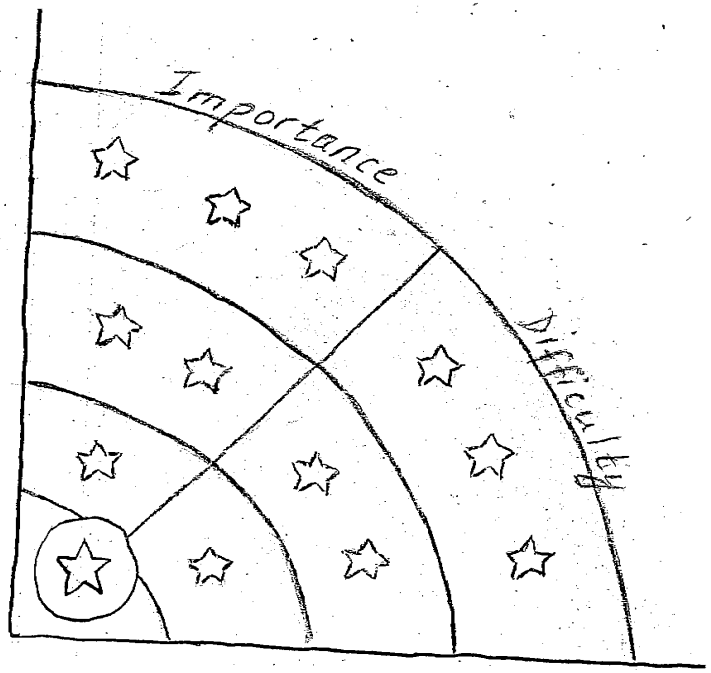
Lectures

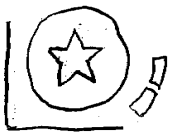
Help

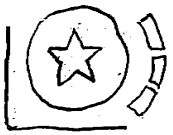


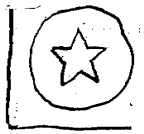


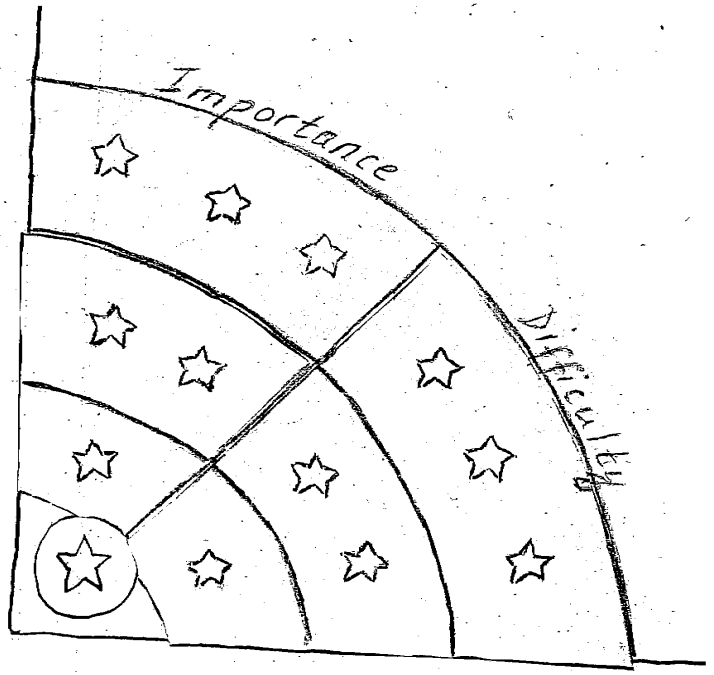


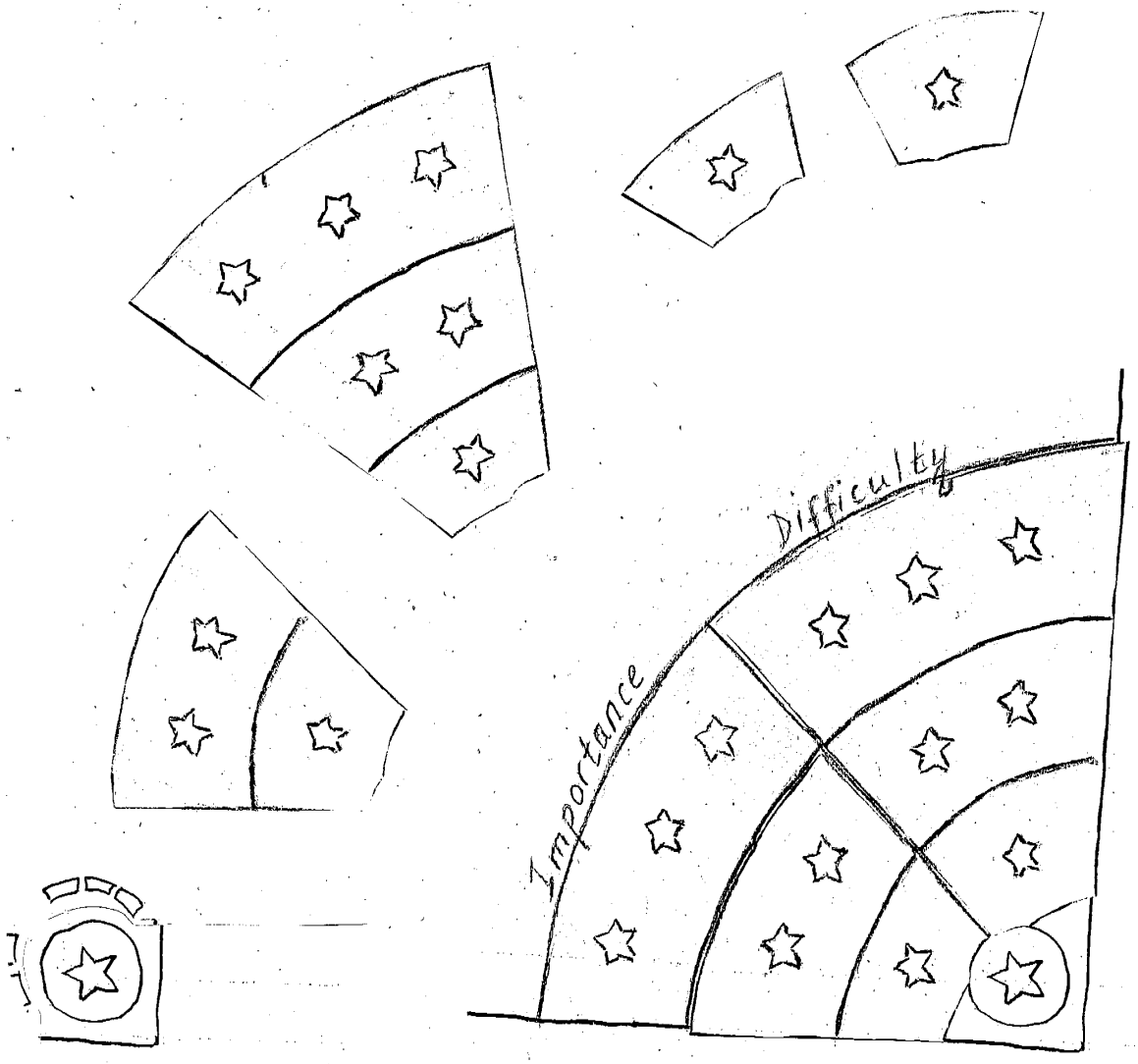

Importance
Difficulty

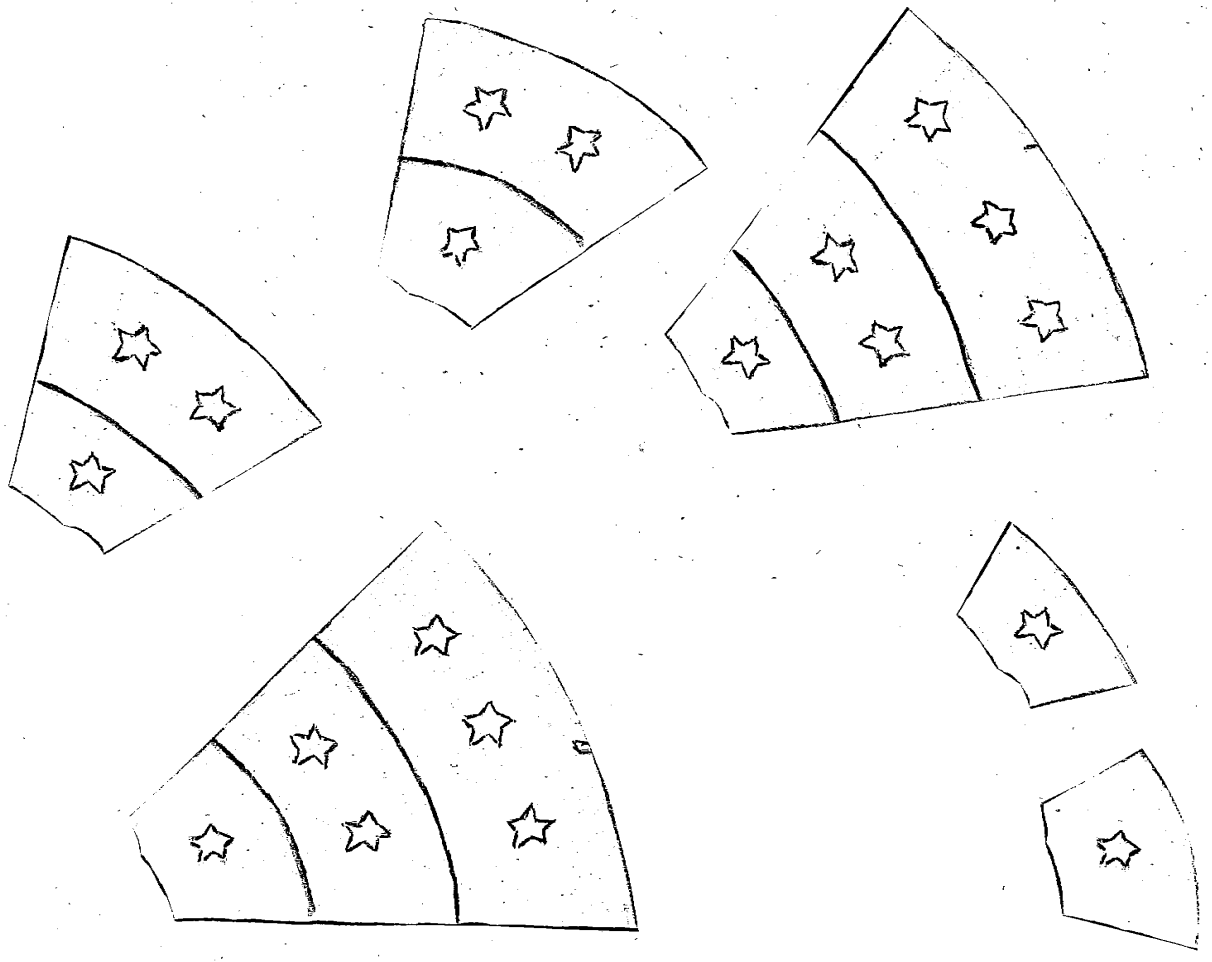




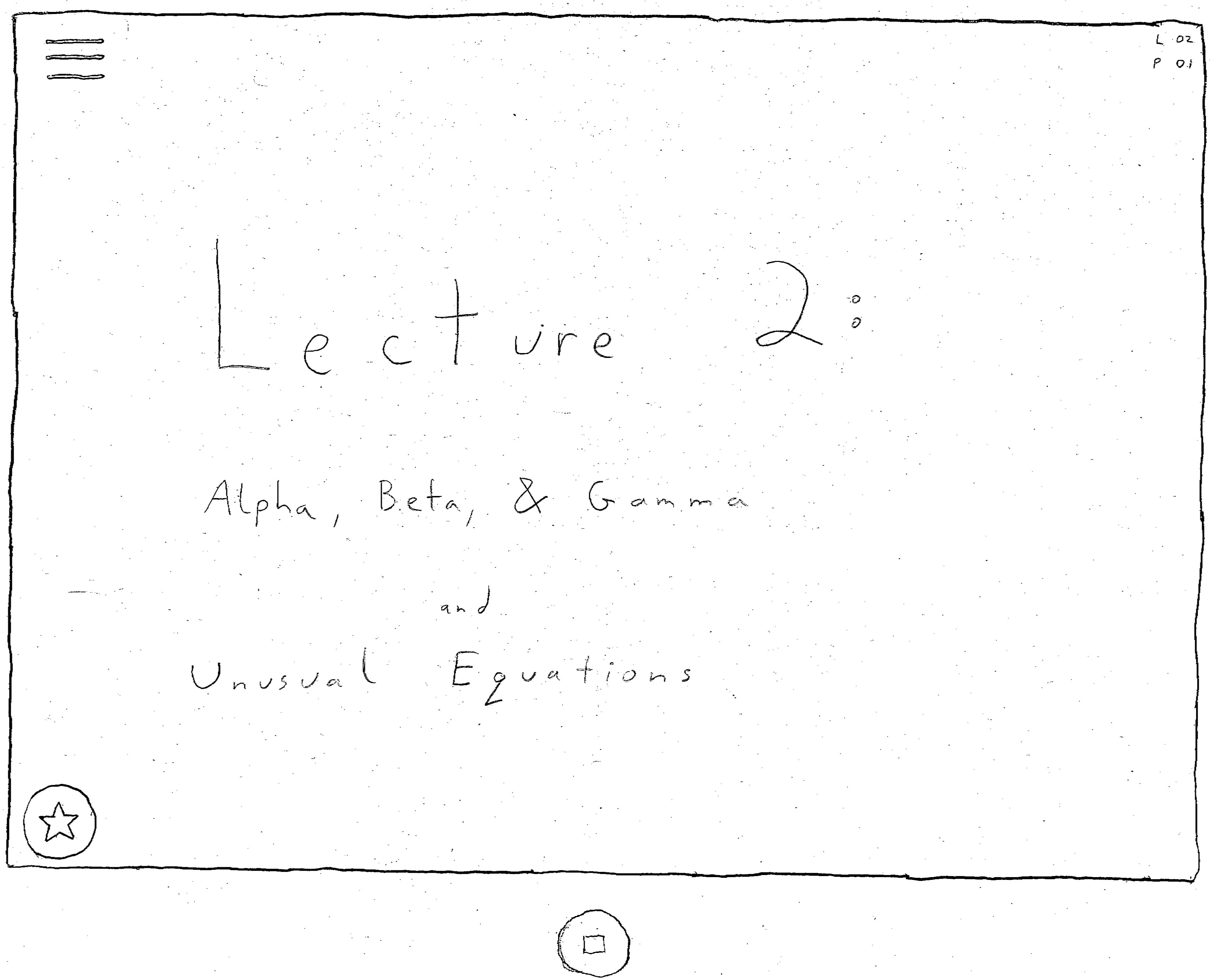



Importance
Difficulty

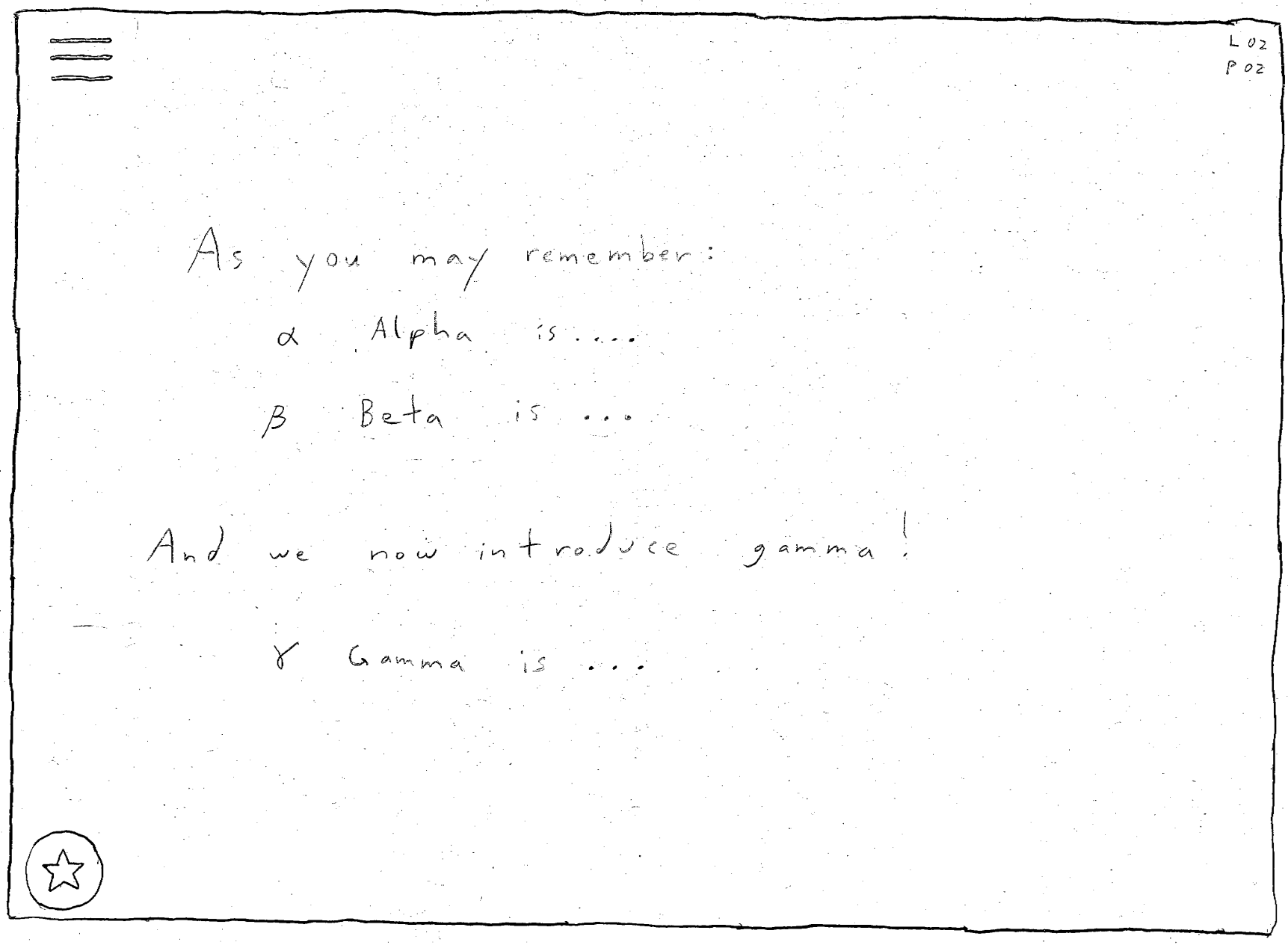

Difficulty
Importance



a tablet



a tablet


L 02
P 02
As you may remember:
α Alpha is....
β Beta is ...
And we now introduce gamma!
γ Gamma is ...

alablet

L 02
P 03

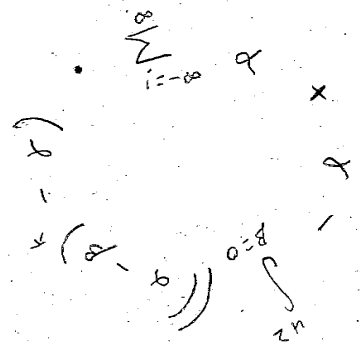
These new variables can be related and we can prove:

$$(\alpha + \beta)^k - \gamma = 42$$

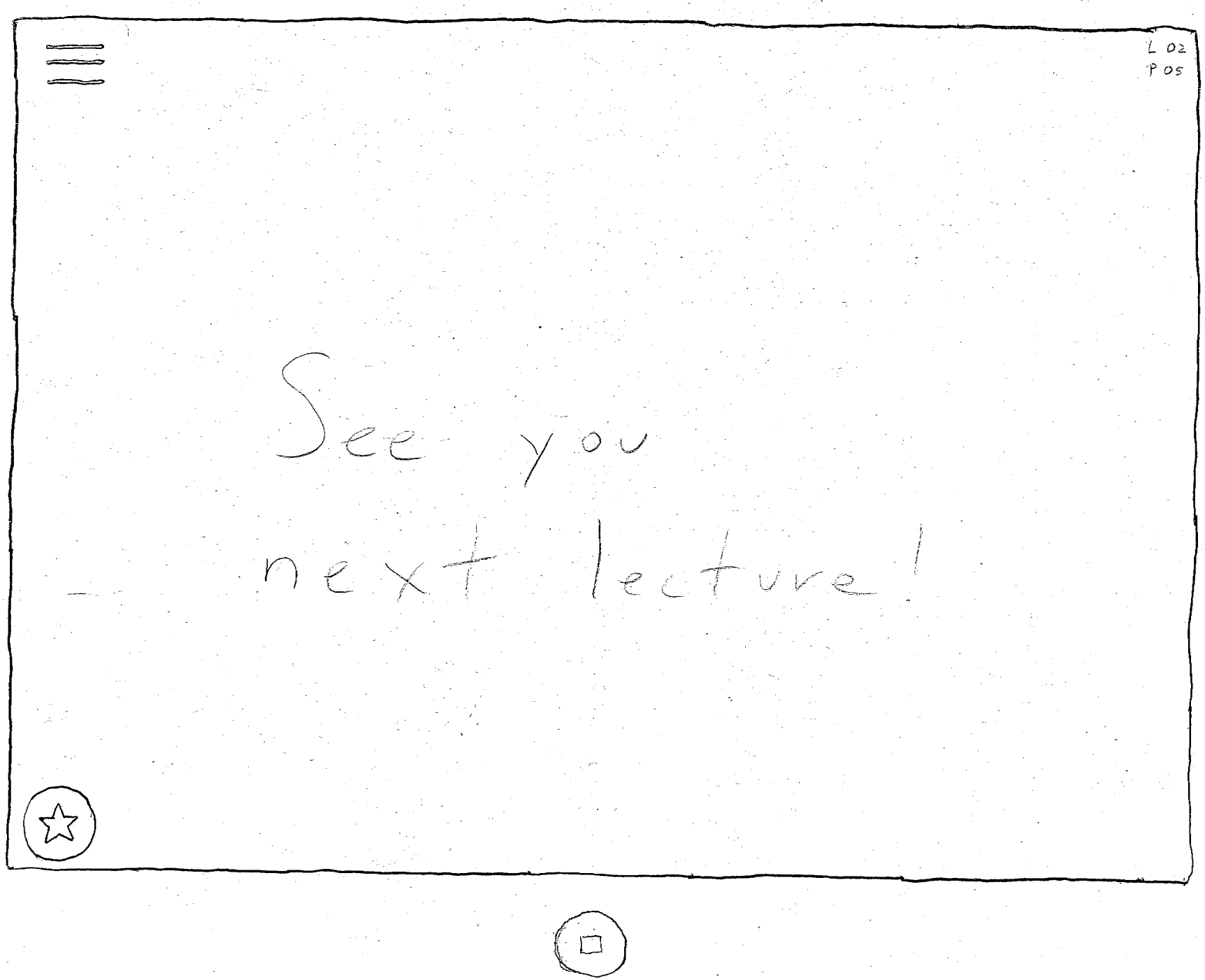
a tablet

L 02
F 04

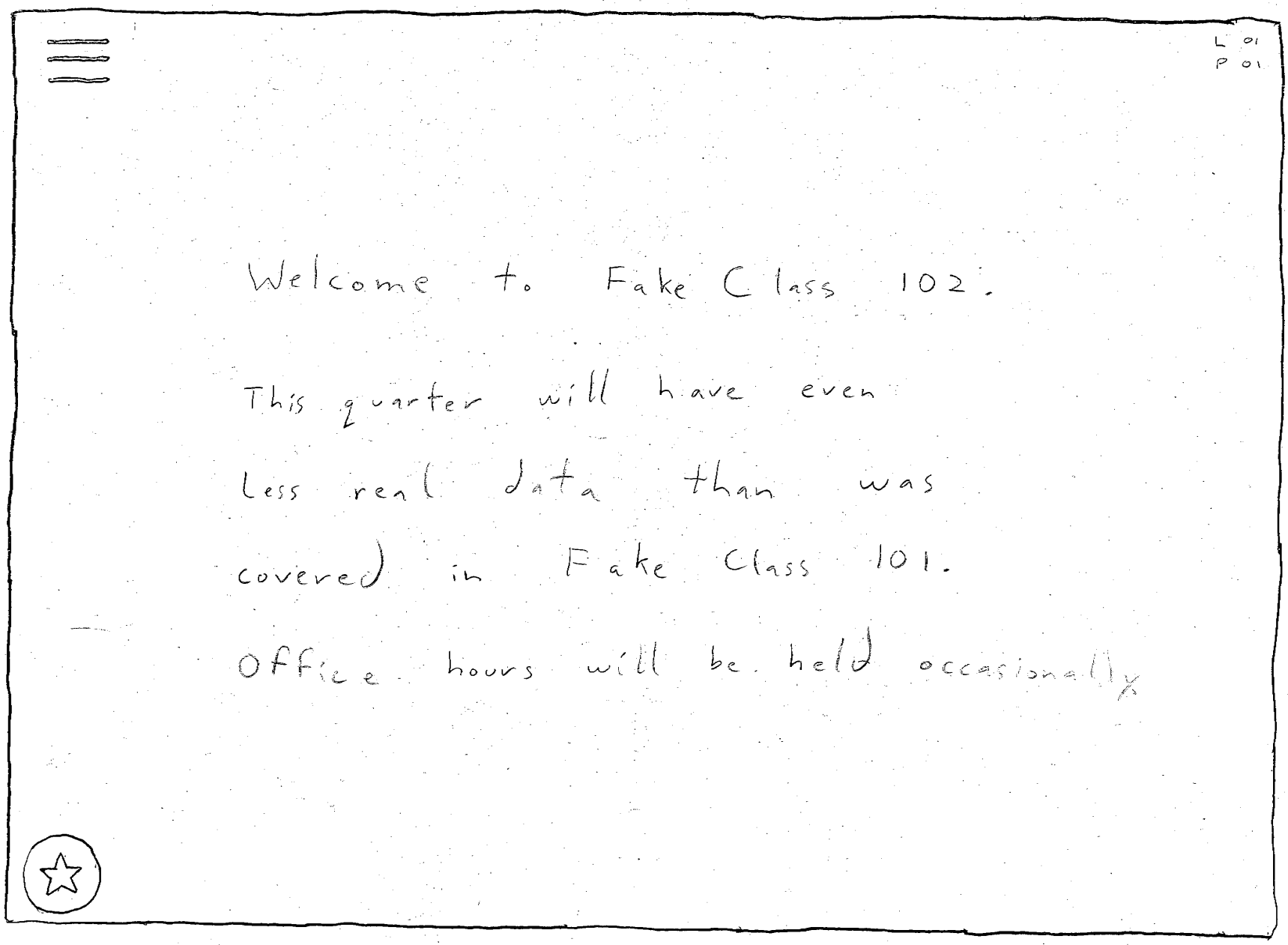
We now have the basis for exploring the field of unusual equations.



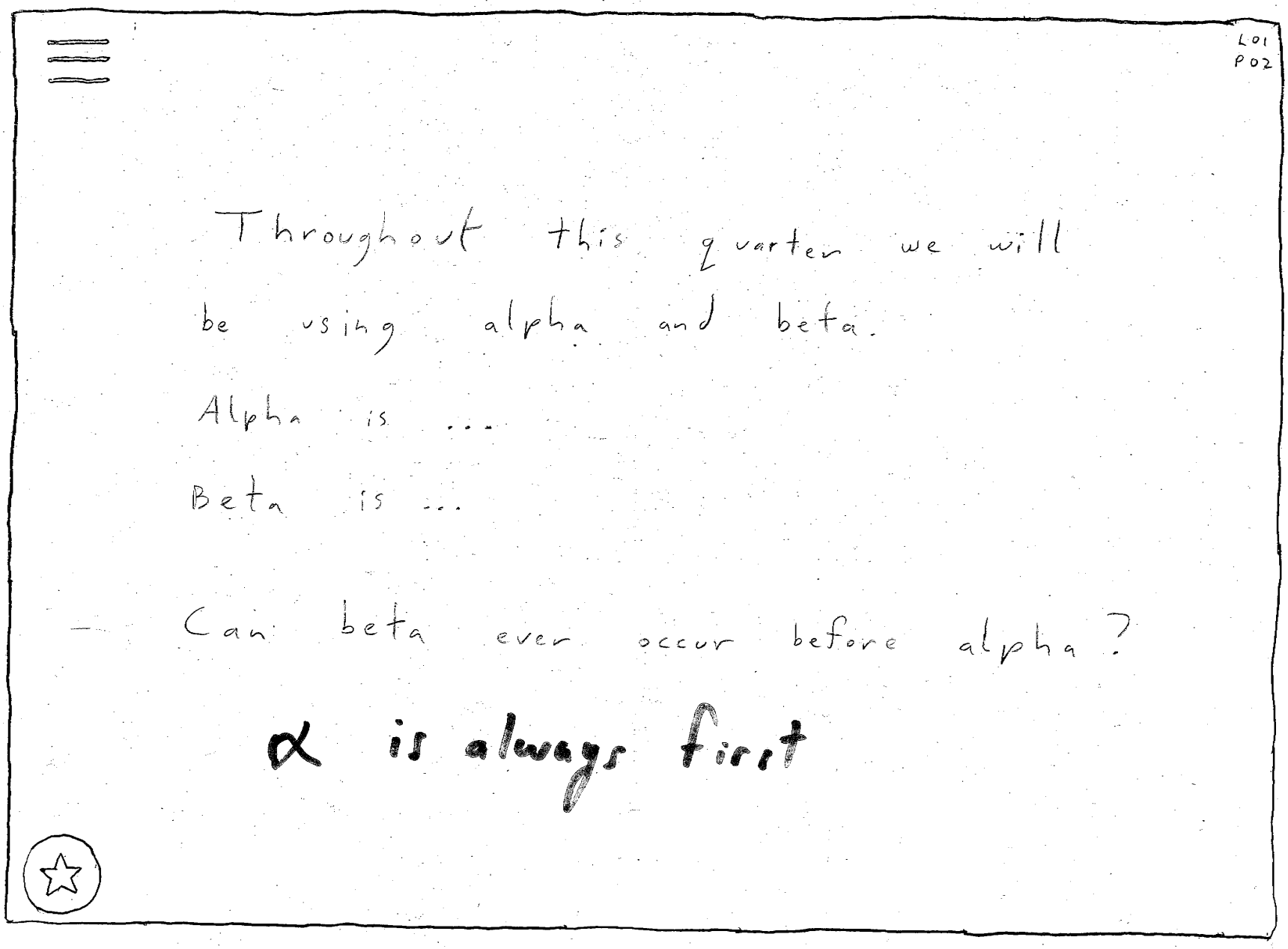
a tablet



a tablet


L 01
P 01
Welcome to Fake Class 102.
This quarter will have even
less real data than was
covered in Fake Class 101.
Office hours will be held occasionally

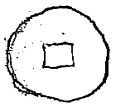
alablet


L01
P02
Throughout this quarter we will be using alpha and beta.
Alpha is ...
Beta is ...
— Can beta ever occur before alpha?
α is always first

aTablet

Lecture 2

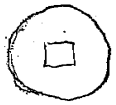
Slide	Topic	Importance	Difficulty	# of Questions	Notes / Questions
1	Alpha, Beta, d...				
2	Alpha, Beta, d...				
3	Unusual Eque...				
4	unusual Eque...				



a tablet

Fake Class 102

Lecture #	Topic	Difficulty	Importance
2	Alpha, Beta, & Gamma	0 ☆	0 ☆
		0 ☆☆	0 ☆☆
		0 ☆☆☆	0 ☆☆☆
	Unusual Equations	0 ☆	0 ☆
		0 ☆☆	0 ☆☆
		0 ☆☆☆	0 ☆☆☆
1	Introduction	0 ☆	0 ☆
		0 ☆☆	0 ☆☆
		0 ☆☆☆	0 ☆☆☆
	α and β	1 ☆	0 ☆
		0 ☆☆	1 ☆☆
		0 ☆☆☆	0 ☆☆☆

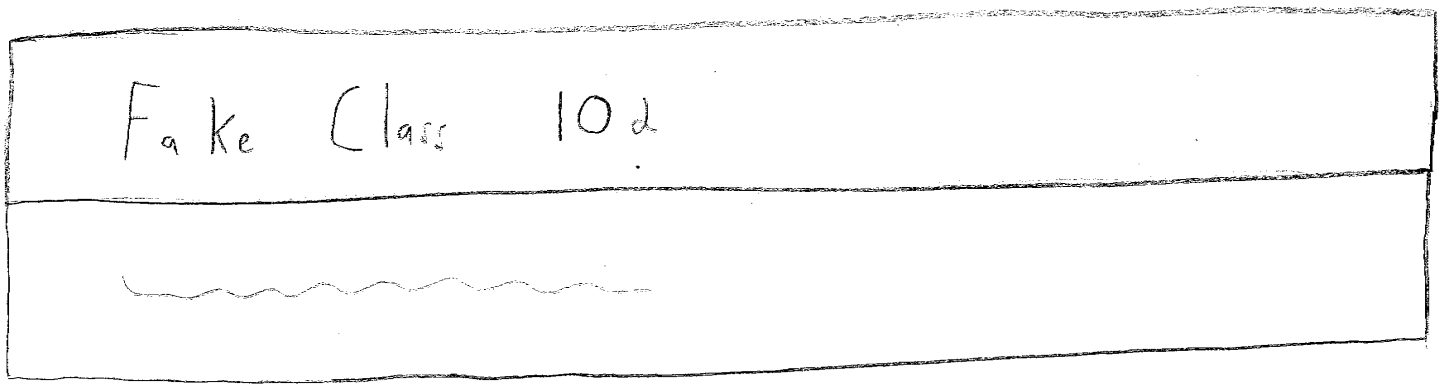


a tablet

Lecture 1

Slide	Topic	Importance	Difficulty	# of Questions	Notes / Questions
1	Introduction			0	
2	α and β	☆☆	☆	2	α is always ...

Your Classes



Appendix:
Heuristic Evaluation Notes

E1 T1

Main Page - maybe ? button HE 10 Sv 1
[Fix 3]

Home button - taking you to main class? HC 4
[Fix 3] · Sv 2

How do I go back to slides HC 3 → Sv 3
[Fix 3]

← [back] button? Confusing FC 102. HC 7.
↳ Sv 1 [Fix 4]

- Lecture page too busy HC 8 Sv 3
[Fix 2]

E1 T1

HC 4 - help menu - change note by Sv 0
question [Fix 3]

HC 4 - Lecture 2 - change page P02 to slide 02 Sv 1
[Fix 4]

Make sure you let people know that is their tablet → Sv 2
(Else need logout) [Fix 4]

E1 T1

HC 4 - Lecture 2 - change "page" by slide. → Sv 1
[Fix 4]

Add "eraser" to pen back-end
[Fix 4]

HC 3 - add pen color and size. → Sv 2
(and maybe eraser size)

[Fix 2]

HC 7 - Log out/ Exit in the main menu:

E1 T2

How to remove rating?

[Severity 2] [Fix 3]

← All blank bar

E1 T1

Importance/ Difficulty

0/0 ☆	0/0 ☆☆	0/0 ☆☆☆

E2 T1

#8: Too much info in a single view
→ minimize to most important info.
Collapse lecture to single line
w/ accordion expansion maybe

Sev: 2

[Fix 3]

E2 T1

#4: Slide list does not tell me its clocable.

Make more obvious that clicking will show pdf notes/slides.

Sev: 3

[Fix 2]

E2 T1

#9: Have another way to submit a question, instead of adding "??" at the end.

Fix: dedicate an icon that can be dragged to the question,

S: 2

[Fix 3]

E2 T1

#3: ~~[illegible]~~ Not being able to change pen color could make notes illegible.

Fix: Allow users to change pen color.

Sev: 3

[Fix 2]

E2 T1

#3: ~~[illegible]~~ Menu, and rating button could interfere with user's interaction with slide:

Rec: auto hide menus when user is interacting w/ slide

S: 4

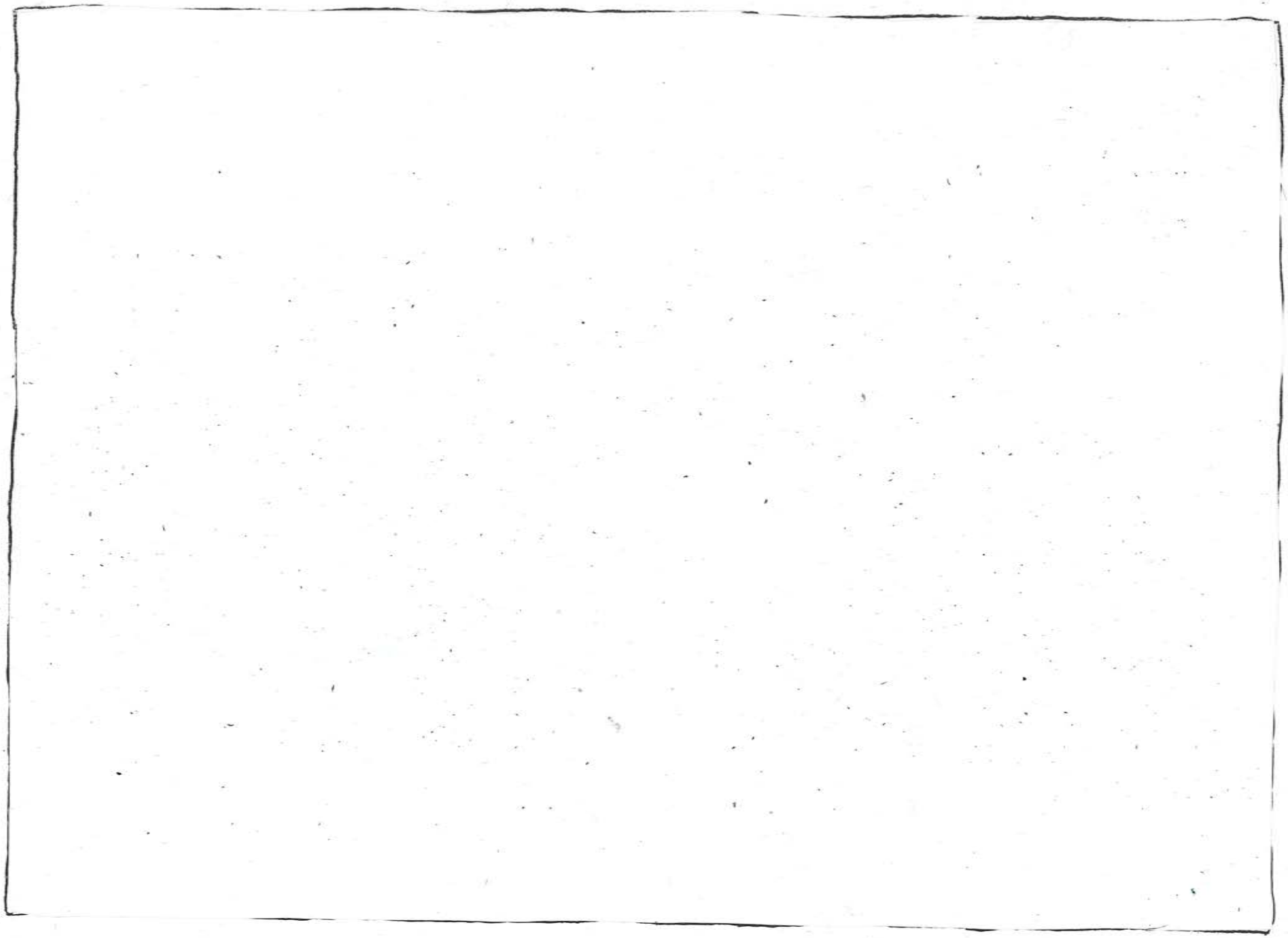
[Fix 3]

Notecards have heading of E# T# for “Evaluator #, Task #”.

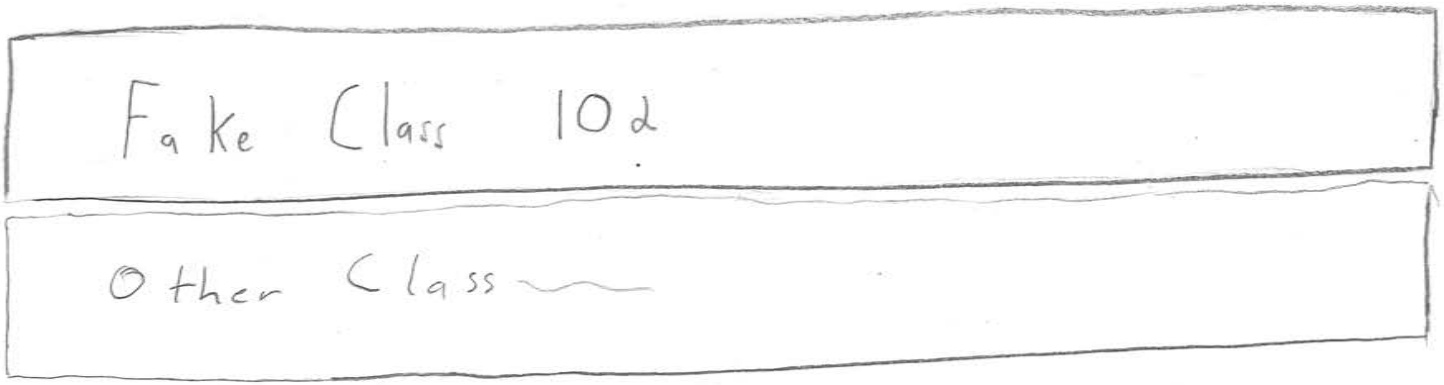
A couple of cards don’t have heuristic numbers. They were afterthoughts during discussion or diagrams of suggestions for heuristic issues.

Appendix:
Paper Prototype v2

a Tablet



Your Classes



a tablet

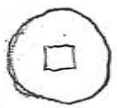
Fake Class 102

Lecture #	Topic	☆	☆☆	☆☆☆
		Importance / Difficulty		
2	Alpha, Beta, & ...	0 / 0	0 / 0	0 / 0
	Unusual Equations	0 / 0	0 / 0	0 / 0
1	Introduction	0 / 0	0 / 0	0 / 0
	α and β	0 / 1	1 / 0	0 / 0

alablet

Fake Class 102

Lecture #	Topic	Difficulty	Importance
2	Alpha, Beta, & Gamma	0 ☆	0 ☆
		0 ☆☆	0 ☆☆
		0 ☆☆☆	0 ☆☆☆
	Unusual Equations	0 ☆	0 ☆
		0 ☆☆	0 ☆☆
		0 ☆☆☆	0 ☆☆☆
1	Introduction	0 ☆	0 ☆
		0 ☆☆	0 ☆☆
		0 ☆☆☆	0 ☆☆☆
	α and β	1 ☆	0 ☆
		0 ☆☆	1 ☆☆
		0 ☆☆☆	0 ☆☆☆



a tablet

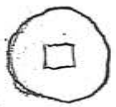
Lecture 1

Slide	Topic	Importance	Difficulty	# of Questions	Notes / Questions
1	Introduction			0	
2	α and β	☆☆	☆	2	α is always first...

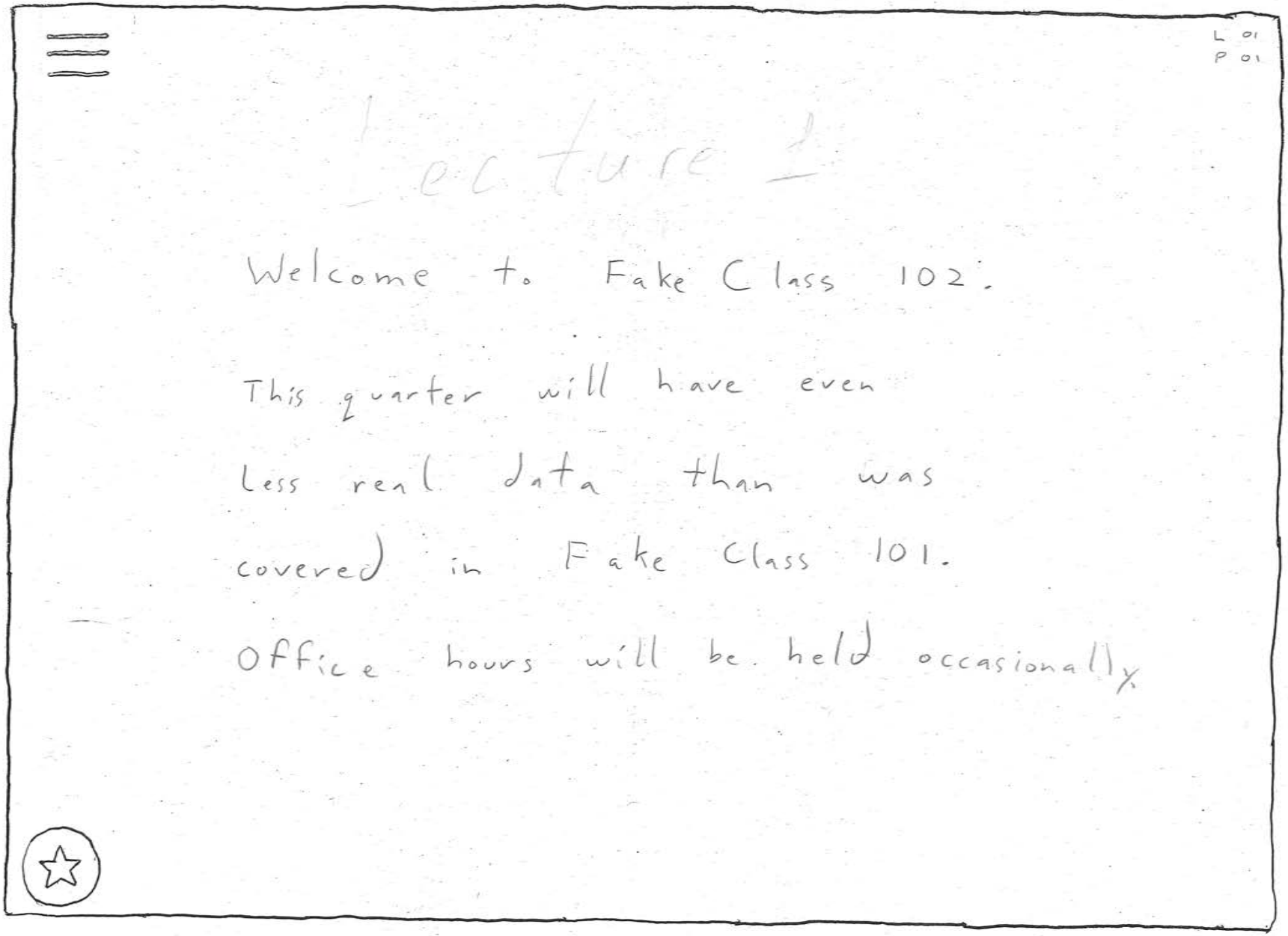
aTablet

Lecture 2

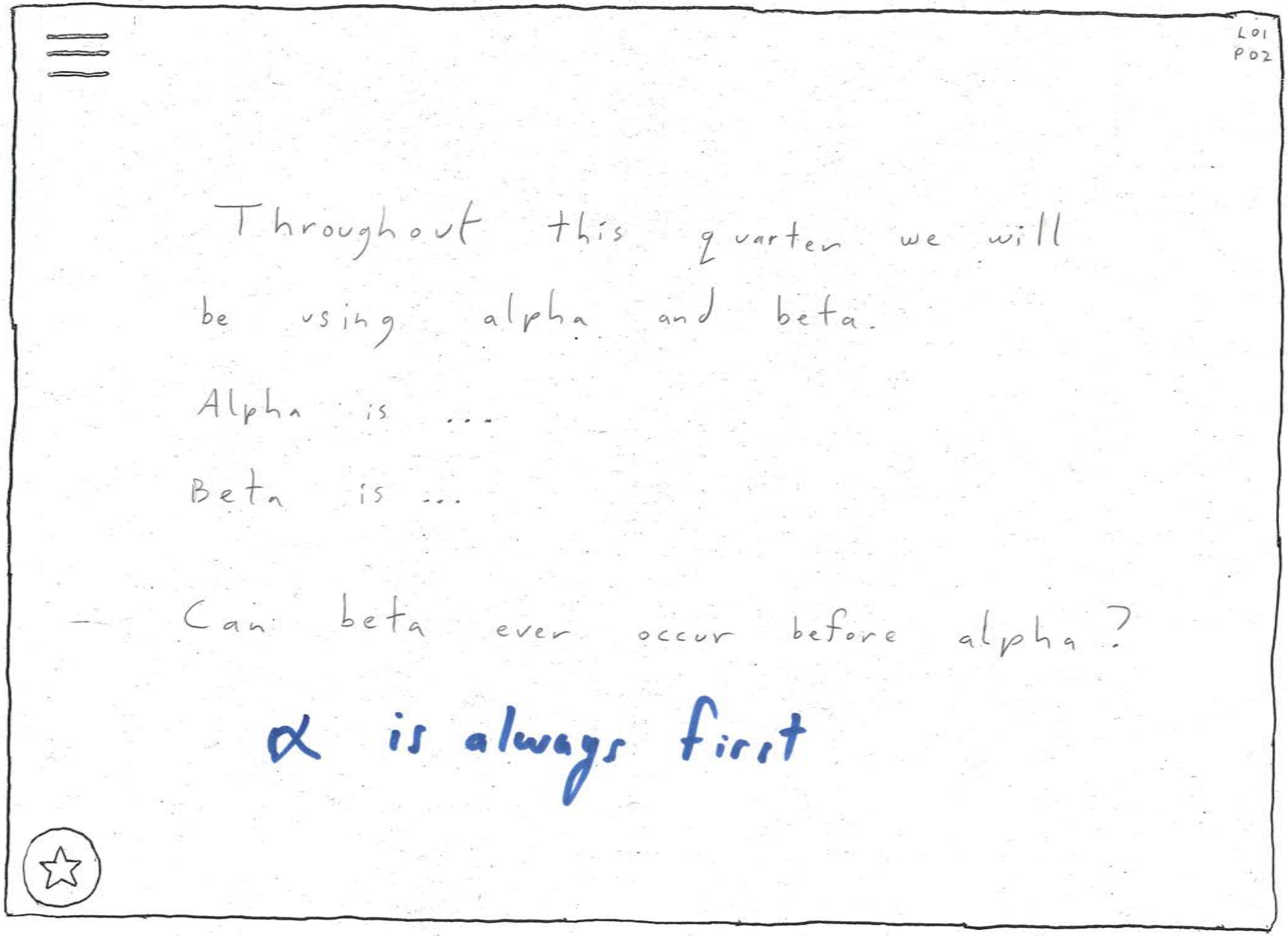
Slide	Topic	Importance	Difficulty	# of Questions	Notes / Questions
1	Alpha, Beta, &				
2	Alpha, Bete, d...				
3	Alpha, Beta, & ...				
4	unusuel E que...				
5	Unusual Equations				



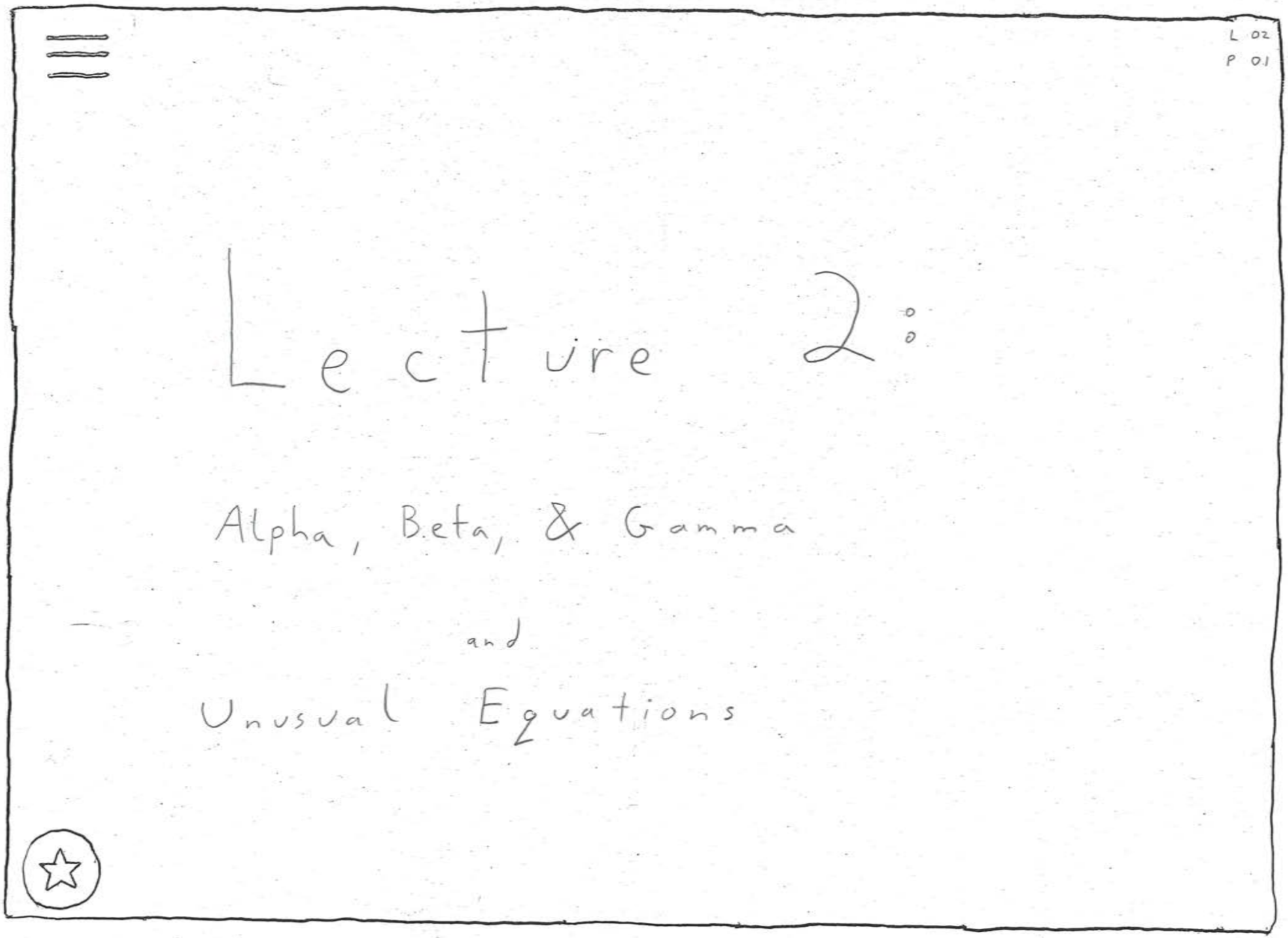
a tablet


L 01
P 01
Lecture 1
Welcome to Fake Class 102.
This quarter will have even
less real data than was
covered in Fake Class 101.
Office hours will be held occasionally.

a tablet


L01
P02
Throughout this quarter we will be using alpha and beta.
Alpha is ...
Beta is ...
— Can beta ever occur before alpha?
α is always first

a tablet



a tablet

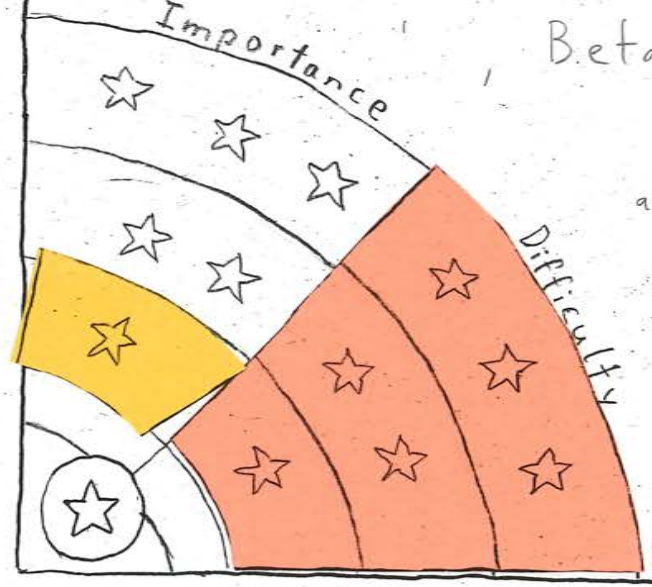
L 02
P 01

Lecture 2:

, Beta, & Gamma

and

Equations



a tablet

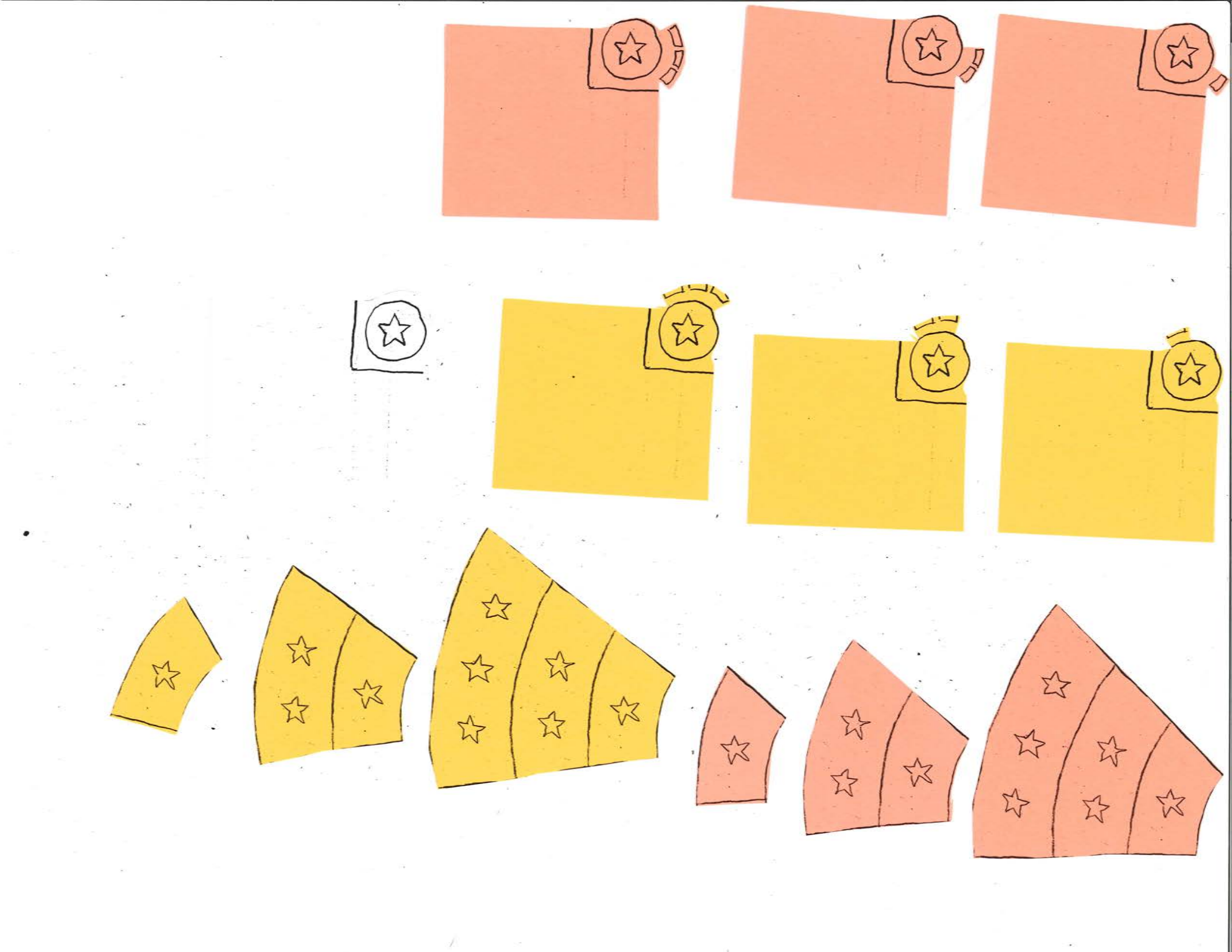
L 02
P 01

Lecture 2:

Alpha, Beta, & Gamma

and

Unusual Equations



☰ FC 102

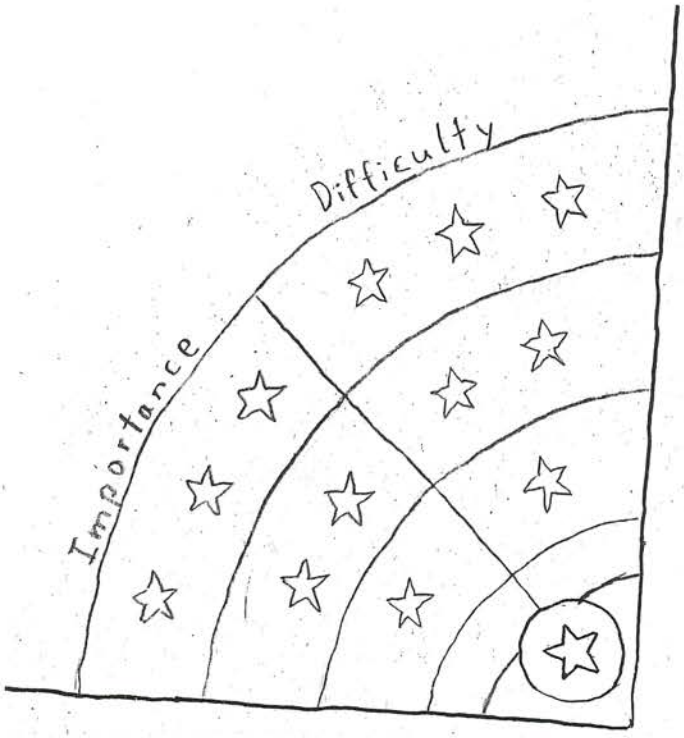
slides

Lectures

Classes

? Help

Exit



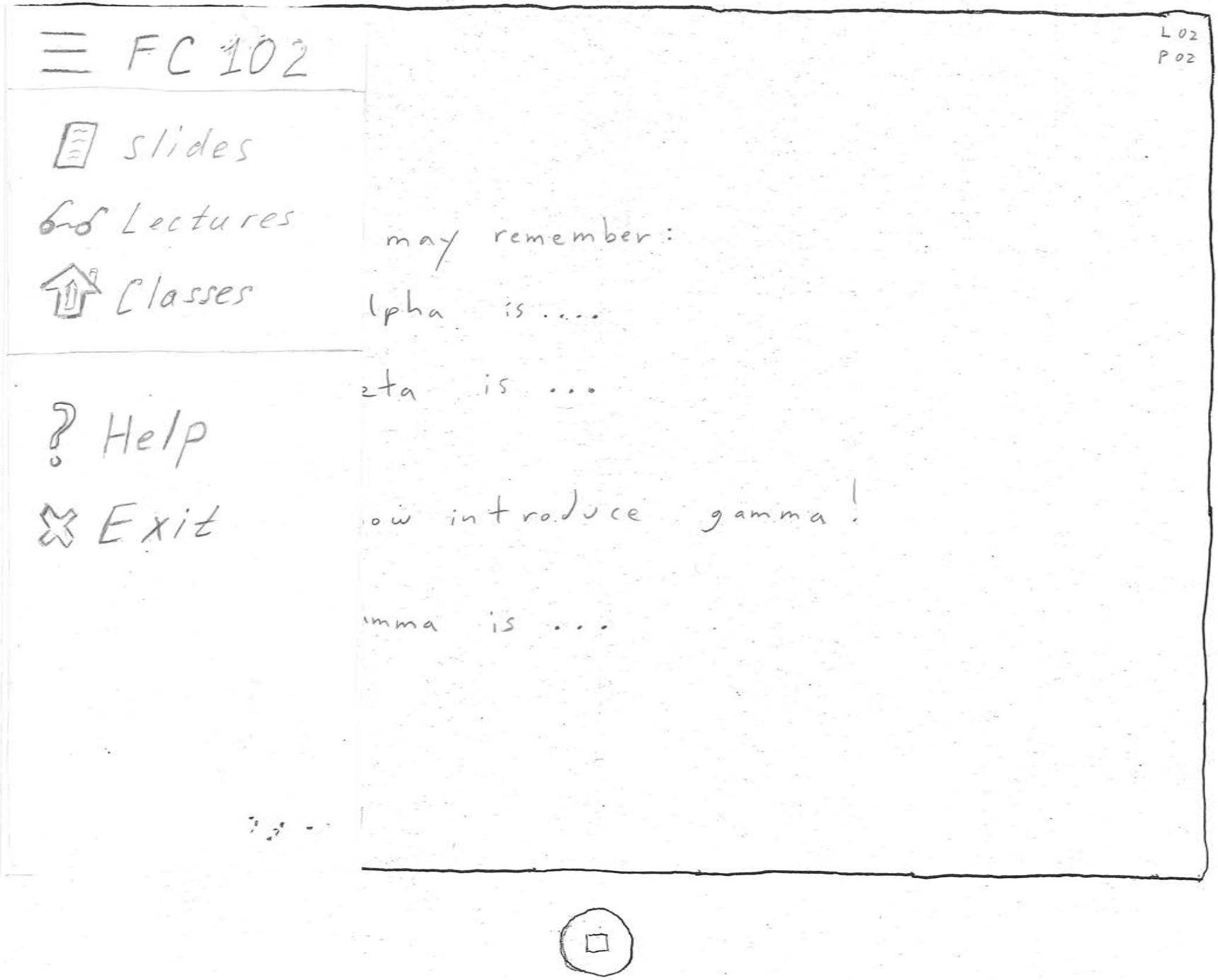
How To Use Study Q.

- Take notes directly on the slide.
- When you have a question, add a "??" to the end of the note.

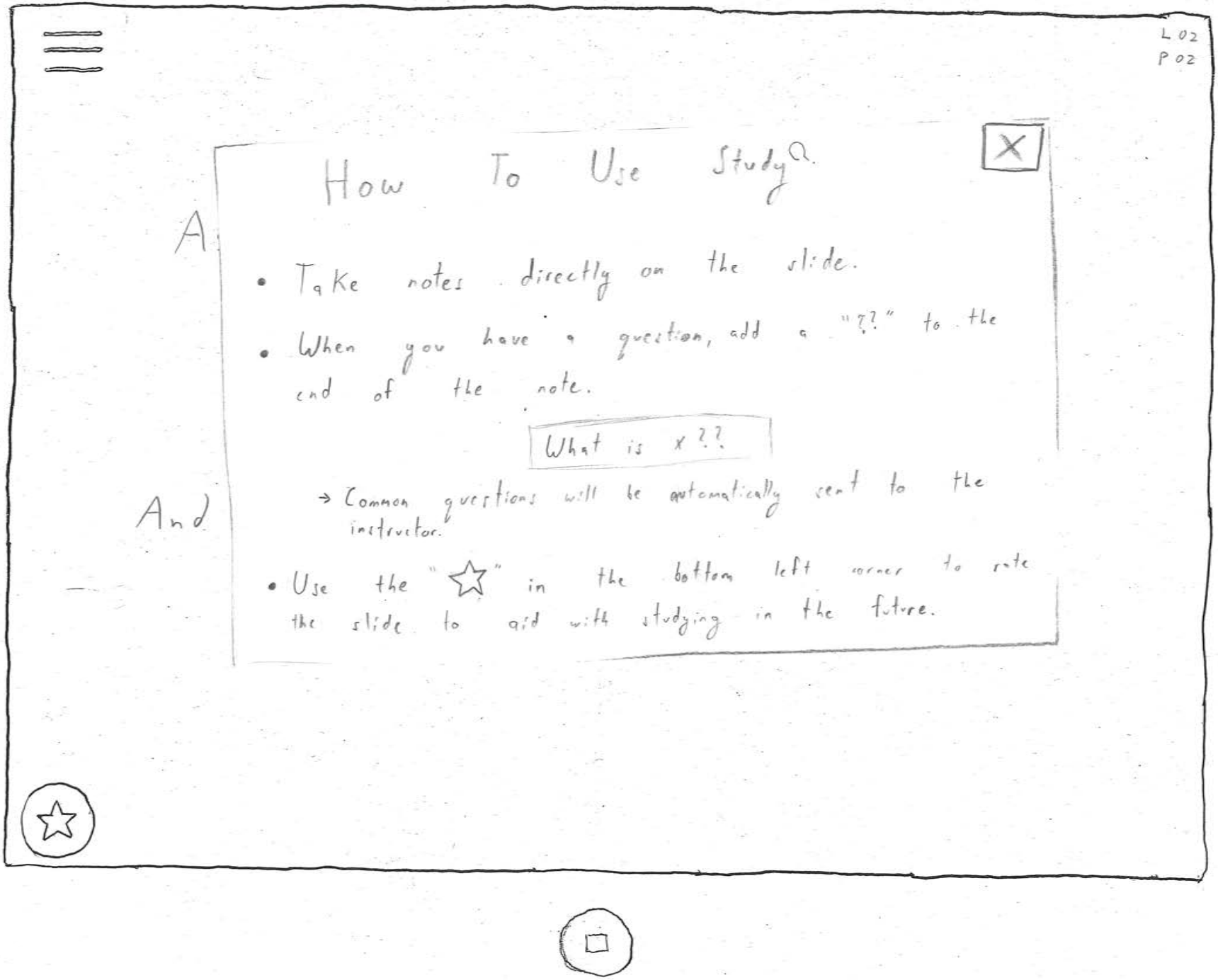
  What is x ??

  → Common questions will be automatically sent to the instructor.
- Use the "☆" in the bottom left corner to rate the slide to aid with studying in the future.

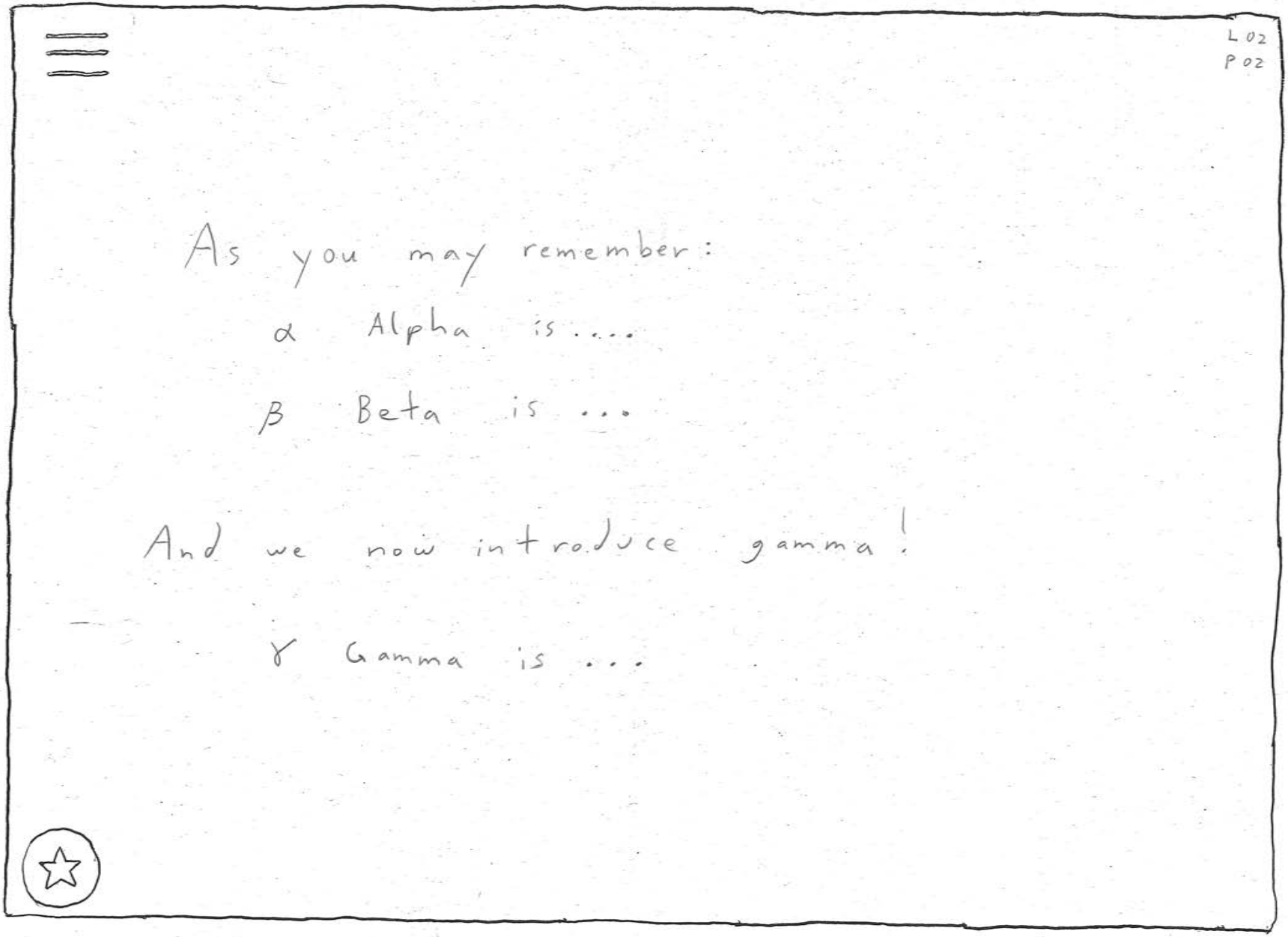
a tablet


FC 102
slides
Lectures
Classes
Help
Exit
L 02
P 02
may remember:
lpha is ....
zta is ...
ow introduce gamma!
mma is ...

a tablet


L 02
P 02
How To Use Study
A
• Take notes directly on the slide.
• When you have a question, add a "??" to the end of the note.
What is x??
And
→ Common questions will be automatically sent to the instructor.
• Use the "☆" in the bottom left corner to rate the slide to aid with studying in the future.

a tablet


L 02
P 02
As you may remember:
α Alpha is ....
β Beta is ...
And we now introduce gamma!
γ Gamma is ...

a tablet

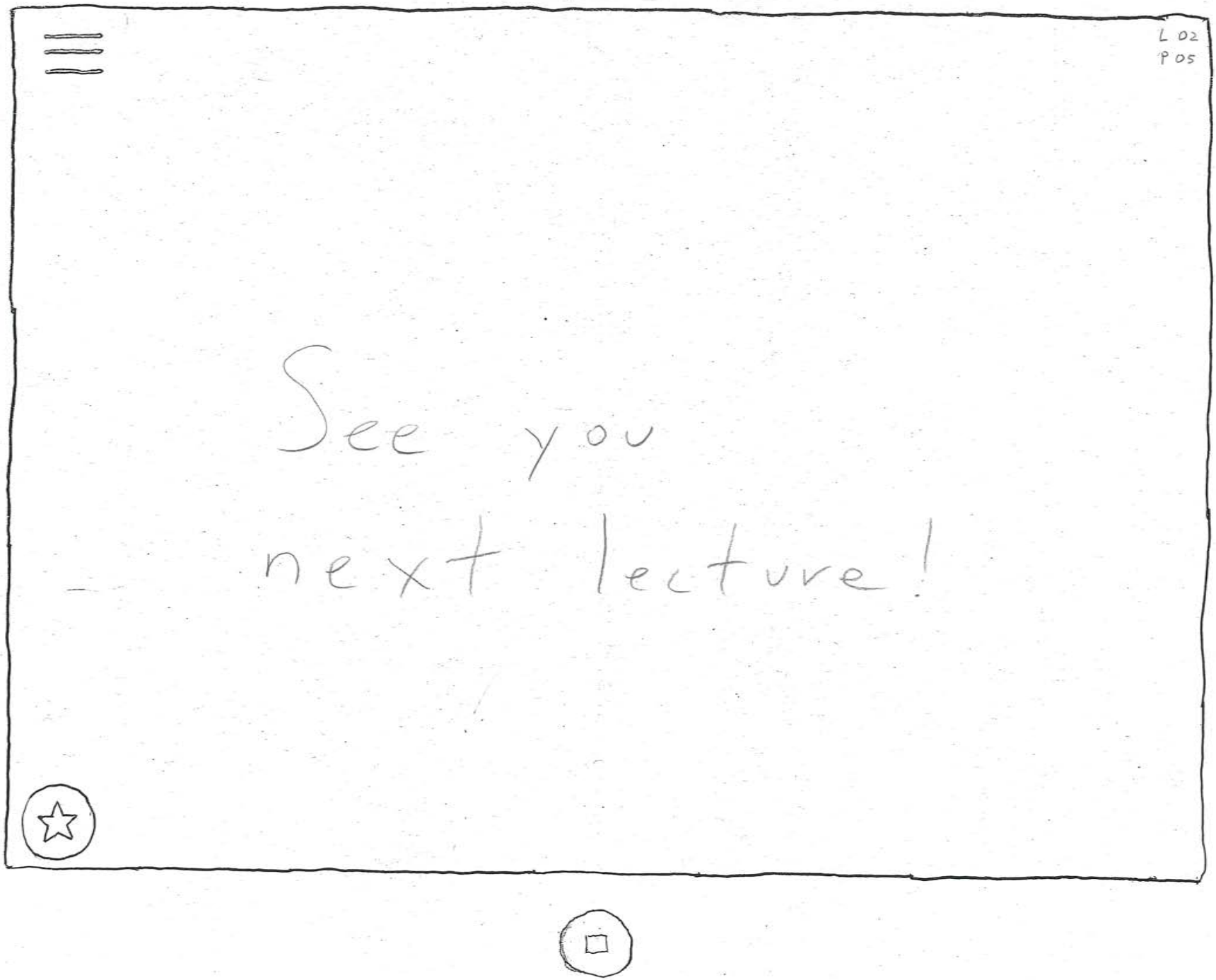
These new variables can be related and we can prove:

$$(\alpha + \beta)^{\sigma} - \gamma = 42$$

a tablet

We now have the basis for exploring the field of unusual equations.

a tablet



Appendix:
Usability Test 1 Notes

Participant 01

Directions for ?? were confusing.

Had to help!

Participant tried to click o or click ?? in the help menu.

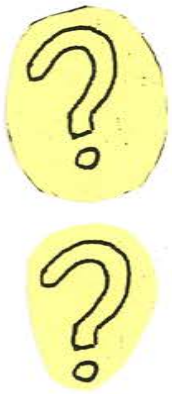
Participant comment during debrief:
Make asking question more graphical.

Dragging (?) icon idea was liked.

Make more obvious that each slide listed is a clickable button.

Liked index card version of lecture list better than v01 or v02

Appendix:
Paper Prototype v3



☰

Clases

Pen Color

? Help

✕ Exit

☰ FC102

Lectures

Clases

Pen Color

? Help

✕ Exit

☰ FC102

slides

Lectures

Clases

Pen Color

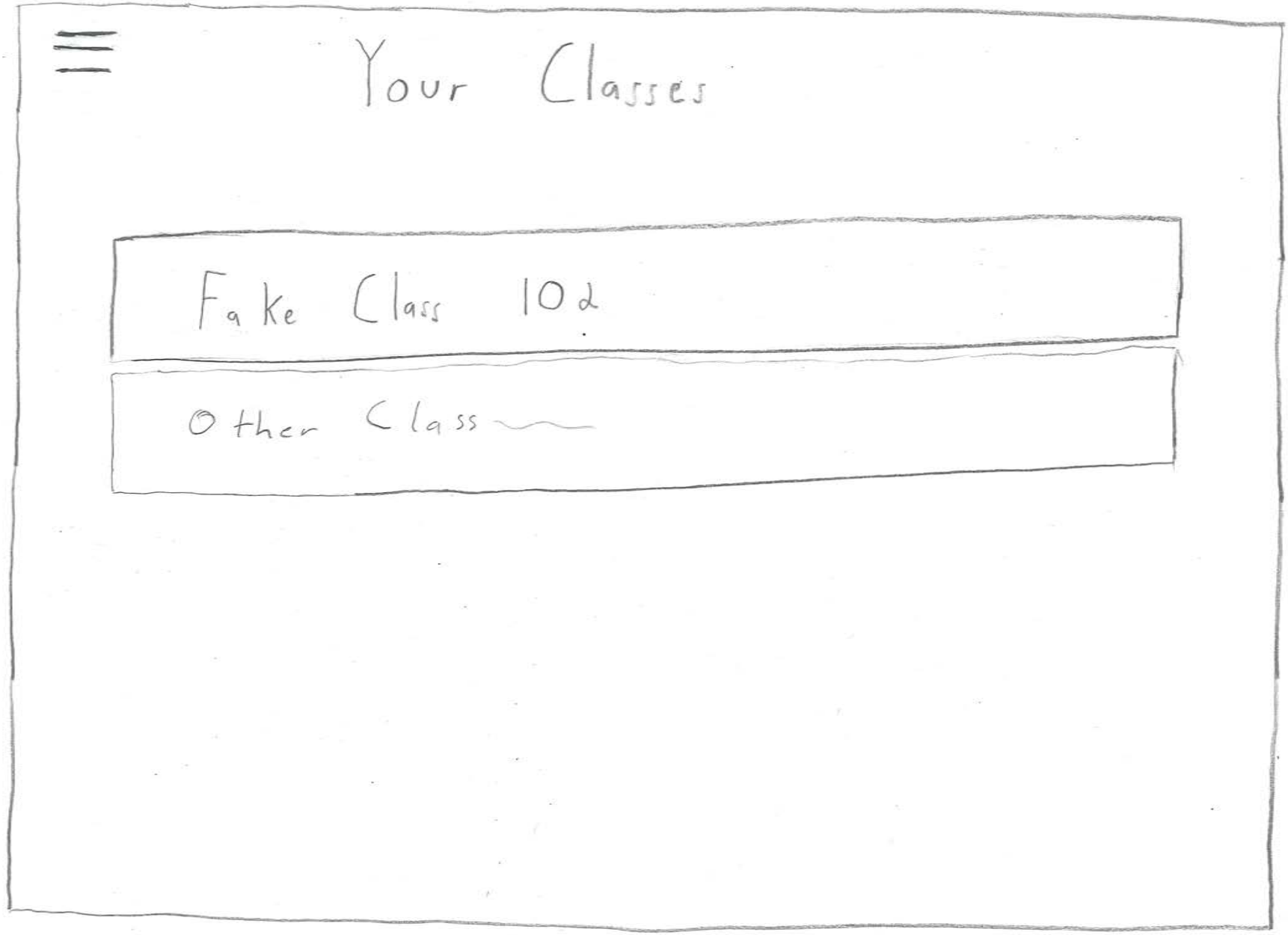
? Help

✕ Exit

alablet

Fake Class 102

Lecture	Topic	Importance & Difficulty
2	Alpha, Beta, & ...	0☆0 | 0☆0 | 0☆0
	Unusual Equations	0☆0 | 0☆0 | 0☆0
1	Introduction	0☆0 | 0☆0 | 0☆0
	α and β	0☆1 | 1☆0 | 0☆0

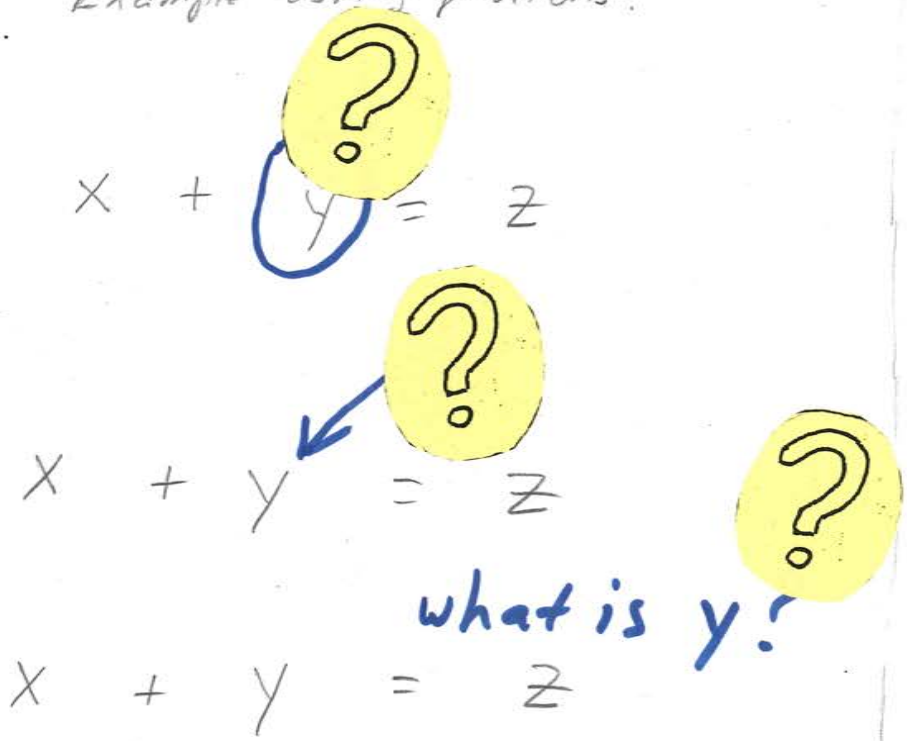

Your Classes
Fake Class 102
Other Class

a tablet

User Guide

- Take notes directly on slides
- when you have a question, drag question mark icon into circled, arrowed or written question.

Example asking questions:

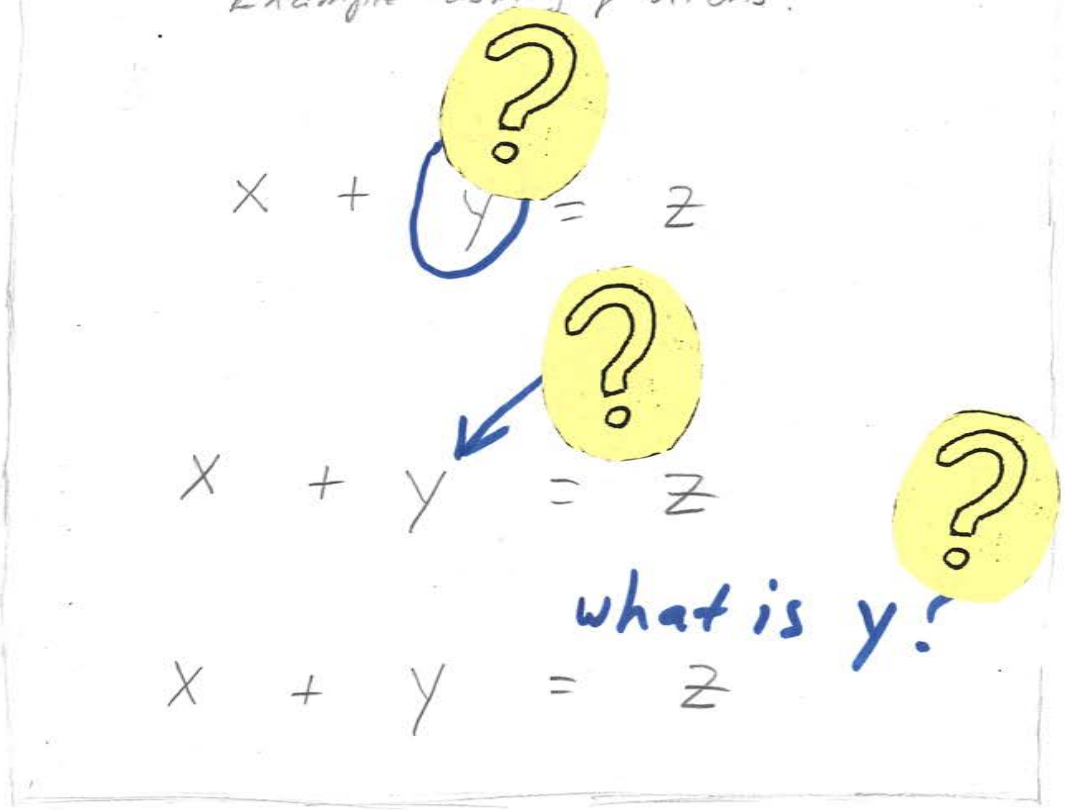


- To rate the slide, press the ster and tap or drag to selected rating

User Guide

- Take notes directly on slides
- when you have a question, drag question mark icon into circled, arrowed or written question.

Example asking questions:



- To rate the slide, press the ster and tap or drag to selected rating

Appendix:
Usability Test 2 Notes

Use Test 2 RL

Pre-HCDE / Pre-CS Undergrad Male

UseTest 2 AT

- he said lecture 2 instead slide 2 (
- not sure if can get rid of difficulty / all together

UseTest 2 AS

- not sure how to exit a question and that question mark can be dropped
- indicate the question is asked / not asked.

UseTest 2 ☆ ratings SJSN

- Used personal note to rank uniqueness not rating system
- Drag off to clear or "unselect"

UseTest 2 Lecture Screen SJSN

- Slide count would be helpful
- Didn't know where to click
- Thought rating was "class" data & not information on self
- % seemed like class data, impersonal
- No 0 ☆'s, superfluous data (use counts it do)

UseTest 2 Question Asking SJSN

- Tried to click "?" instead of drag
- Thought "Help?" menu was for asking question
- Circled confusing part and put "?", didn't drag "?" to circled part
- Typing on letter notifies of correct behavior

SSIN

Use Test 2 Help menu

- Read through quickly, seemed very clear
- Still got interaction wrong (tab versus ?)
- Scroll down for demand

SSIN

Use Test 2 Reviewing slides

- Managed to navigate to "important" & "difficult" slides easily
- Cleared rating to 1
  - ↳ D.d.n't notice blank field
  - ↳ Typed it again to clear

Usability Test 2

Notes by Royden

Participant is a junior at UW who is not yet in the major. The participant is currently pre-HCDE / pre-CS who identifies as male.

Notes by Andrii

Asking Questions

The participant don’t know how to ask a question. He tries to click on the question mark icon but nothing happens. He then opens the help menu to read instructions. After reading instructions he writes a question on a slide with a question mark. He then still doesn’t drag the question mark into it and has to go back to help menu again. After that he drags the question mark icon to his question and he questions is successfully submitted. He gives a suggestion to give some short instructions when clicking on the question mark icon and to indicate when the question is submitted or not submitted.

Lectures Screen

The participant is confused about ratings of each topic. He says that seeing percentage next to number of starts, makes him think these ratings refer to the whole class, not just his personal ratings and would prefer having number of slides in place of percentages instead .
Also doesn’t see a need of having both number of 0 starts slides and number of untreated slides, suggest keeping only unrated slides instead.

Rating Slides

The participant is able to rate slides without reading instructions on how to do it.

Notes by Sam

Lecture Screen

The participant seemed confused about where to click when prompted to go to a specific lecture, finally deciding to click the actual number. They thought the rating summary was aggregated class data due to the percents. Thought that showing the 0☆’s was superfluous; slide count would be adequate to show the same kind of information.

Question Asking on Slide

The participant tried to click the “?” instead of dragging. When looking for instructions, thought the “? Help” menu would prompt him for a question. After reading the instructions, they wrote a question, ended it in a “?”, and circled it, failing to drag the on-screen “?” to their question. During debrief, suggested adding tap behavior to the on-screen “?” to hint at correct behavior.

Reviewing Slides

The participant easily navigated to the important/difficult slides. Wasn’t able to clear the reviewed slides down to 0, clearing them to 1☆ instead. When told that there is a 0 option, tapped the rating at the rated spot to clear.

Help Menu

Revised help menu seemed very clear. The participant was able to look through it very quickly and understand what he needed to do. However, he still managed to get the interaction wrong on his second attempt, prompting him to reopen the help menu and read a little closer. Suggested that we add scroll behavior for more instructions.

☆ Ratings

When prompted to rate the slide as important, used a personal note instead of the ☆ system. Suggested letting users drag off the end of the menu to deselect a rating (clear to 0).

Appendix:
Paper Prototype v4

a tablet

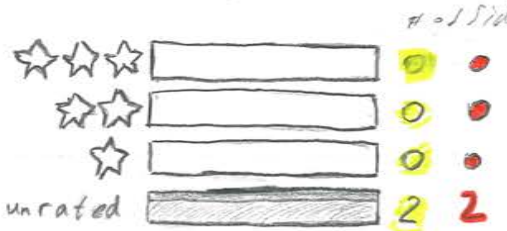
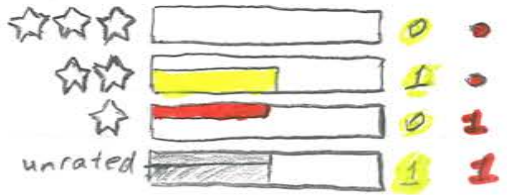
Fake Class 102

Lecture #	Topic	Difficulty	Importance
2	Alpha, Beta, & Gamma		3 star 5% 8% 2 star 12% 12% 1 star 30% 20% 0 star 55% 60%
	Unusual Equations		
1	Introduction		
	α and β		

a tablet

Fake Class 102

importance
difficulty
~~# of slides~~

Lecture #	Topic	
2	Alpha Beta & Gamma	
	Unusual Equations	
1	Introduction	
	α and β	

Appendix:
Usability Test 3 Notes

Use Test 3 RL

Bio Engineering Senior Female

Non-technical

Pen-and-paper user rather than computer

Use Test 3 RL

Jumped to "Exit" on mistake

To move to slide 2, went back to menu rather than swipe right or down (suggestion of [illegible] [illegible] is possibly because paper rather than real tablet)

Use Test 3 RL

Trying to add a rating.
Went back to slides
Tried to write on slide list
Eventually went to help menu, although initially avoided because of "long" [illegible]
Finally successfully rated.

Usr Test 3 KL

"Tutorial" was off-putting.
Sounds like it would "be long".

Prefer "How-to-use" or "How-to"

Tutorial + toast + drop targets
was effective (finally :-)

(suggestion of puzzle pieces)

Usr Test 3 KL

User "Home" button on tablet
to exit rather than menu.

Usr Test 3 KL

Didn't like lectures in reverse order.

Would prefer to be in order

Use Test 3 RL

successfully identified as blank spot on ratings menu

Use Test 3 RL

Successfully interpreted lecture menu,

But would prefer vertical rather than horizontal bars, and would prefer separate graphs for importance and difficulty.

Usability Test 3

Notes by Royden

Participant is a senior at UW in the Bio-Engineering major. The participant identifies as female. The participant does not consider herself especially technically savvy when it comes to computers. This particular participant was especially quick to blame herself for errors in the design, and be flustered because of being observed by the team, but was reassured repeatedly that the test was only of the design, and not testing her or us.

On making a mistake, the participant jumped to hitting the “Home / Exit” button on tablet hardware rather than trying to recover within the app. The participant also used the “Home / Exit” tablet button to leave at the end of the usability test.

When navigating between slides, the participant consistently went to the hamburger menu, and then back to the slides screen, rather than attempting to swipe left-right or up-down.
(During the debrief, the participant said she probably would have tried swiping if it was physically on a tablet, but that the paper prototype did not make her feel like that was an option.)

The first attempt at adding a rating was confusing. The participant did not notice the Star button at all. The participant went back to the slides menu, and attempted to write on the slide in list there, but the first press took her back to the actual slide. The participant eventually tried the “Tutorial” help menu, but was extremely reluctant to do so, because the word “tutorial” made her feel like it would make her go through a long process to get the answer she needed. After finally trying the tutorial (which is a single screen of help), she successfully rated the slide.

As mentioned in the previous comment about ratings, the participant found the word “Tutorial” very off-putting, because it sounded like it would “be long” to get her answer.
(During the debrief, the participant expressed that she would prefer “How-to-use”.)

This participant identified the blank spot on the ratings menu as the location for removing a rating, although she was also tempted to just click the same spot again to unrate (both of which work).

On a positive note, we finally had a student successfully as a question. The tutorial, plus the toast-style instant feedback messages on clicking the “?” button, plus displaying potential drop targets when clicking or dragging the “?” button was effective.

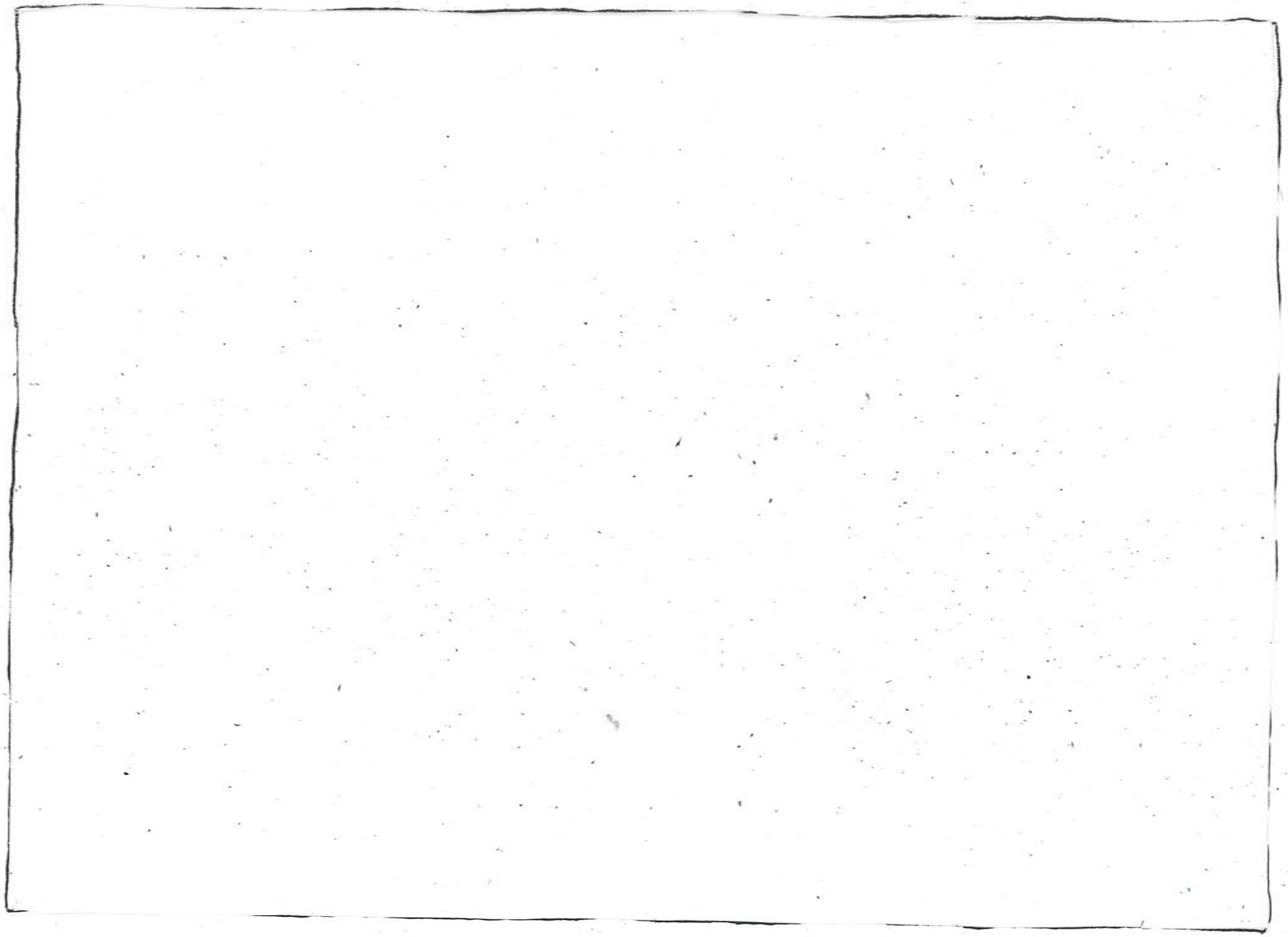
The participant did not have trouble finding the correct lecture, but expressed that she really didn’t like having the lectures in reverse order, and would prefer them to be in ascending order by lecture number. She did like having the “current / most recent” lecture listed at the top

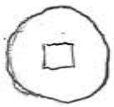
though, and thought that she might like having that in a separate box listed above the rest of the lectures.

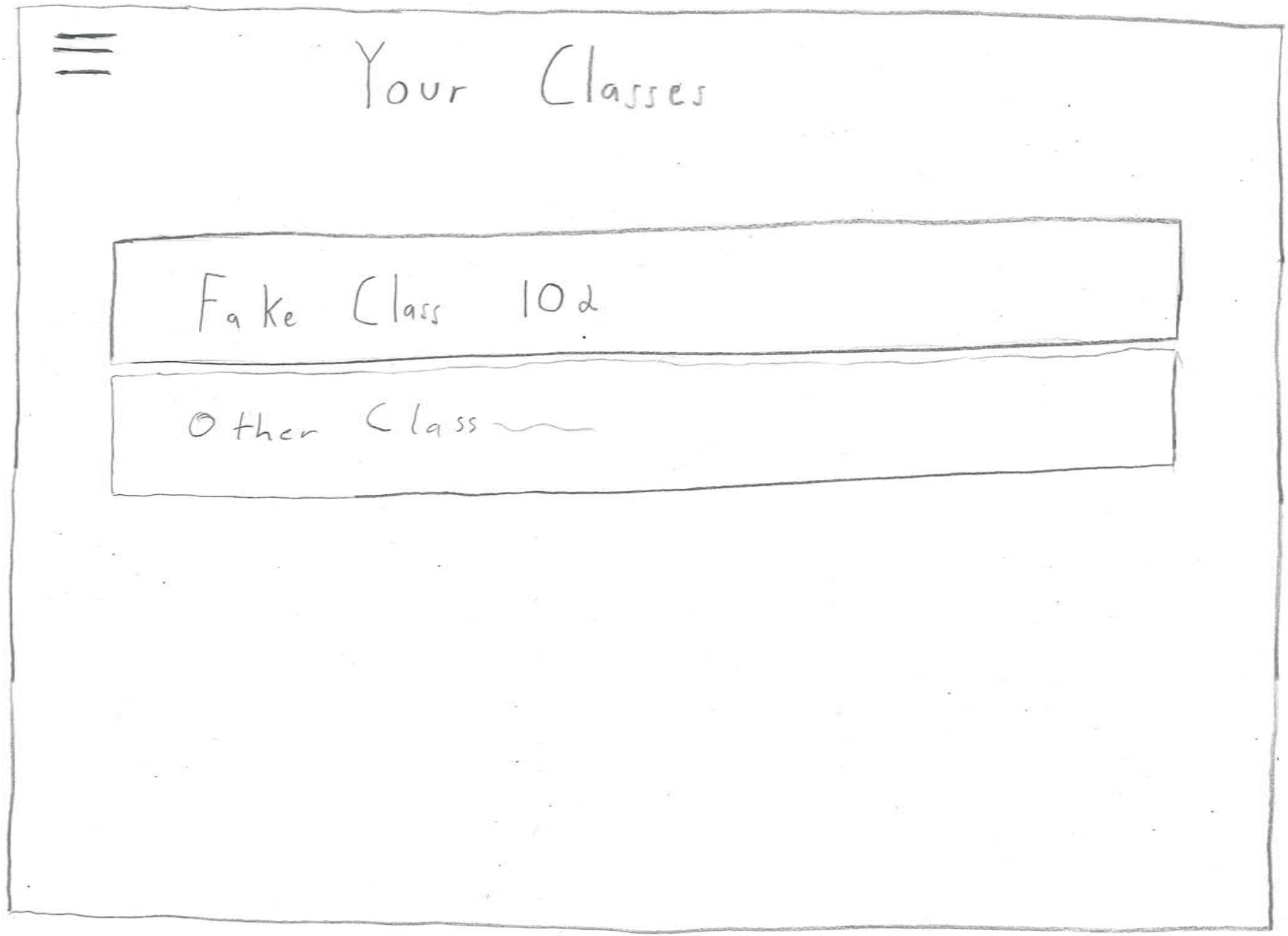
The participant was successfully able to interpret the lecture difficulty graphs without assistance, and felt that they did let her tell which areas to study. However, the participant suggested that vertical bar graphs (rather than horizontal) would make more sense to her for counts of data, and she would prefer separate graphs for importance and difficulty.
(Because of two possible issues, we want to try just separating the graphs into importance and difficulty first. We think leaving the graphs horizontal does a better job of keeping track of total unrated slides without making it seem important. It would be nice if we could do one more usability test with this change.)

Appendix:
Paper Prototype v5

a Tablet






Your Classes
Fake Class 102
Other Class

Fake Class 102

Lecture #		Importance	# of slides	Difficulty	# of slides
2	Alpha Beta & Gamma	☆☆☆	0	☆☆☆	0
		☆☆	0	☆☆	0
	Unusual Equations	☆	0	☆	0
		unrated	2	unrated	2
1	Introduction	☆☆☆	0	☆☆☆	0
		☆☆	1	☆☆	0
	& and B	☆	0	☆	1
		unrated	1	unrated	1

a tablet

Lecture 1

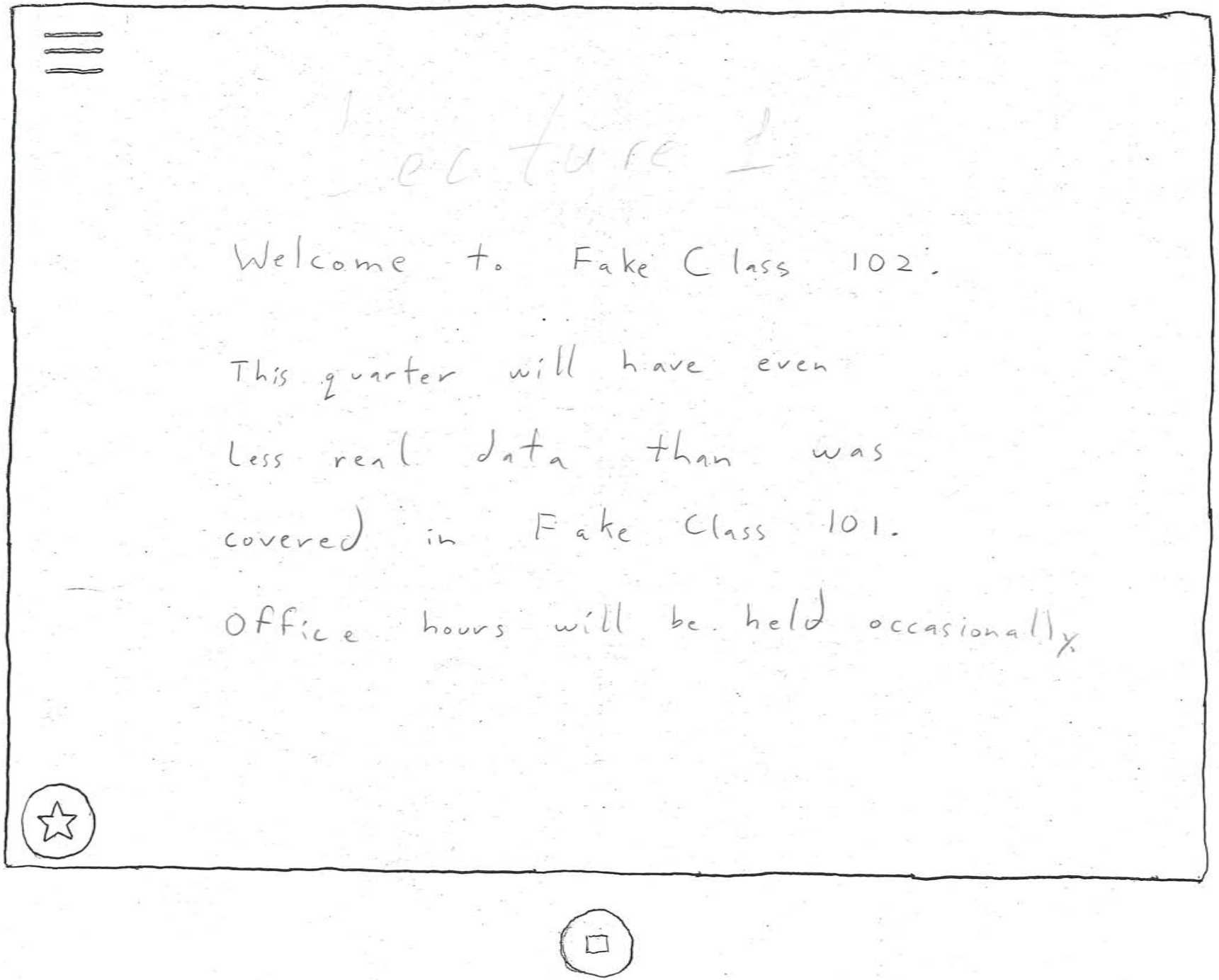
Slide	Topic	Importance	Difficulty	# of Questions	Notes / Questions
1	Introduction			0	
2	α and β	☆☆	☆	2	α is always first

aTablet

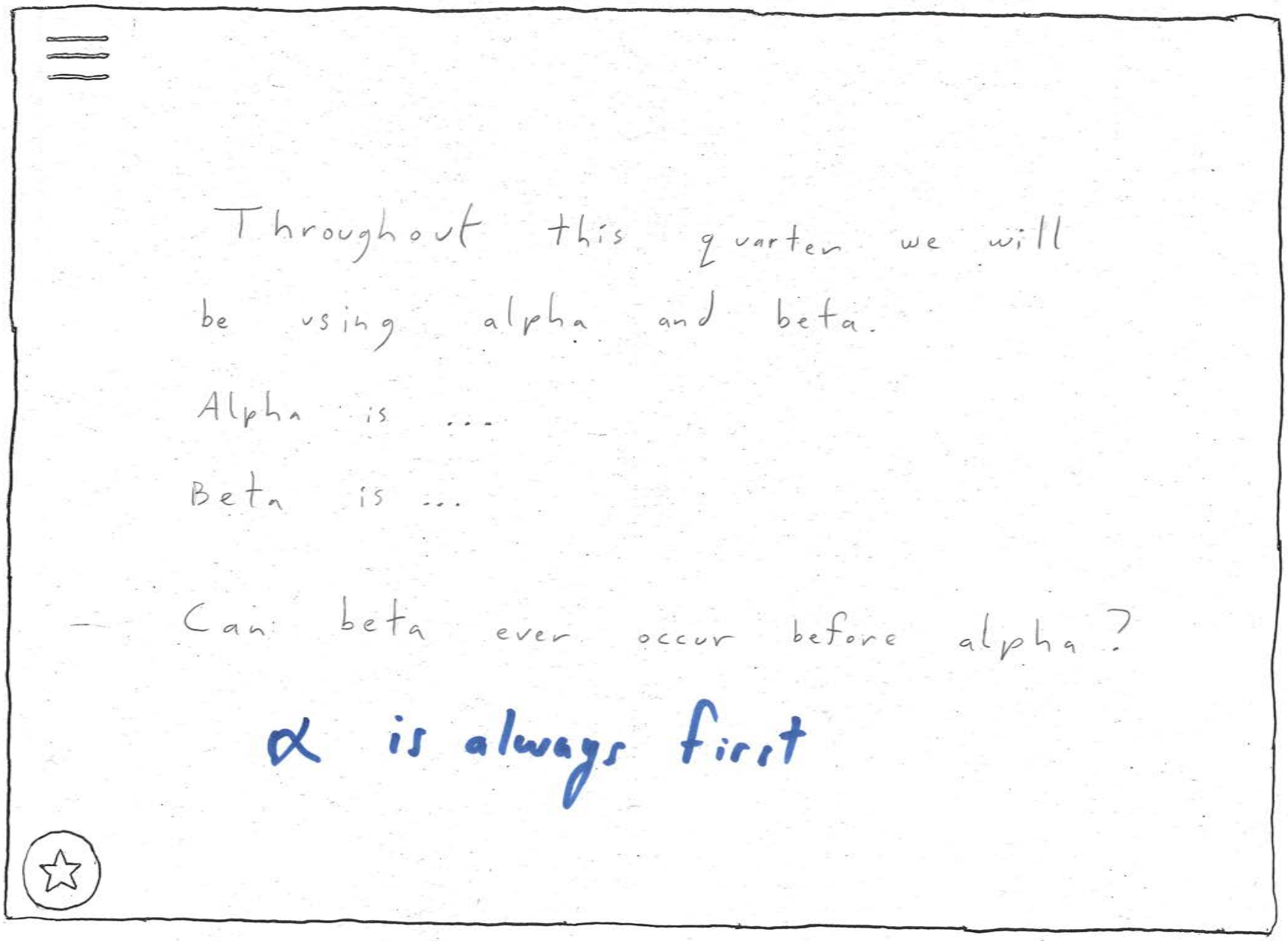
Lecture 2

Slide	Topic	Importance	Difficulty	# of Questions	Notes / Questions
1	Alpha, Beta, &				
2	Alpha, Bete, d...				
3	Alpha, Beta, & ...				
4	unusuel E que...				
5	Unusual Equations				

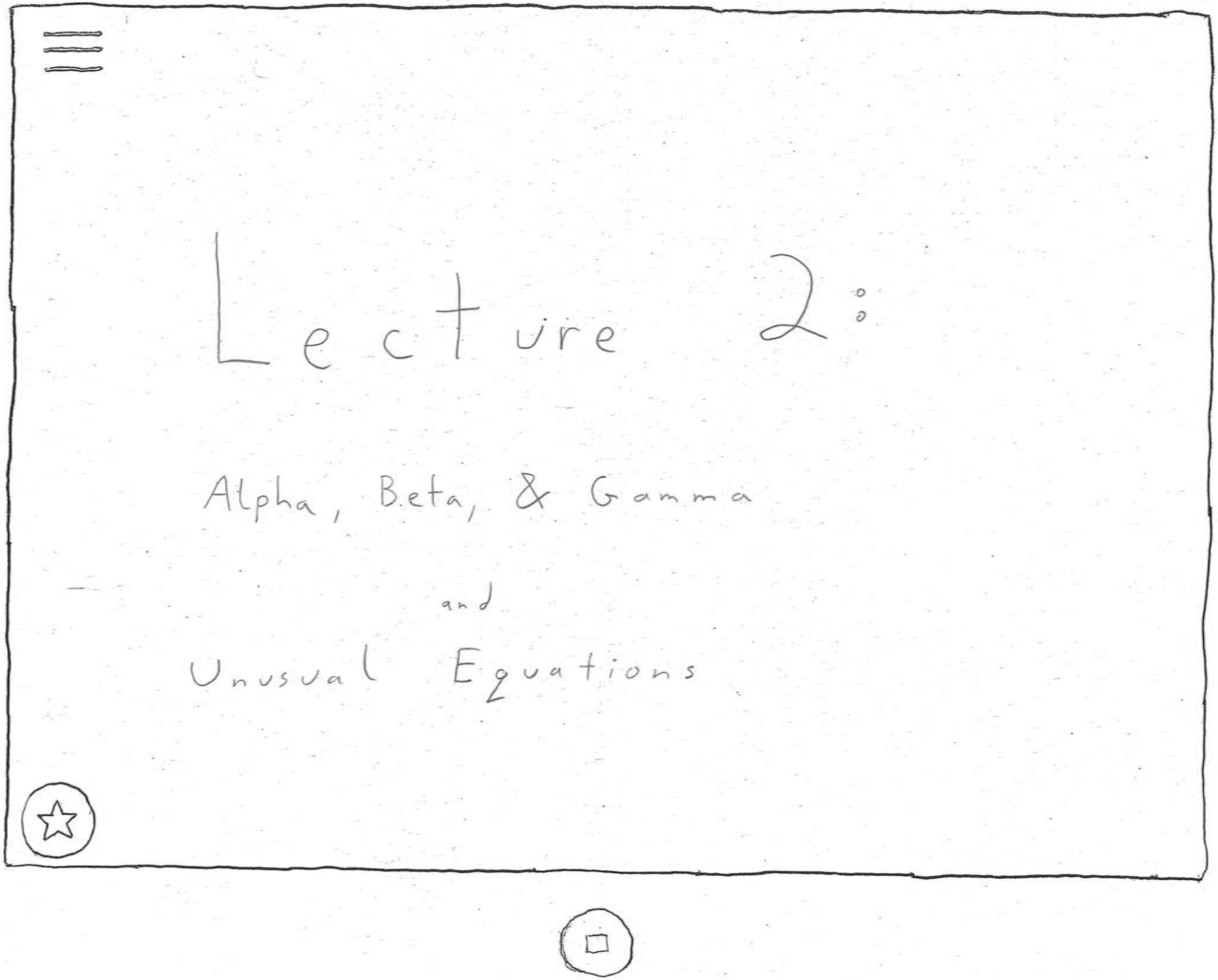
a tablet


Lecture 1
Welcome to Fake Class 102.
This quarter will have even
less real data than was
covered in Fake Class 101.
Office hours will be held occasionally.

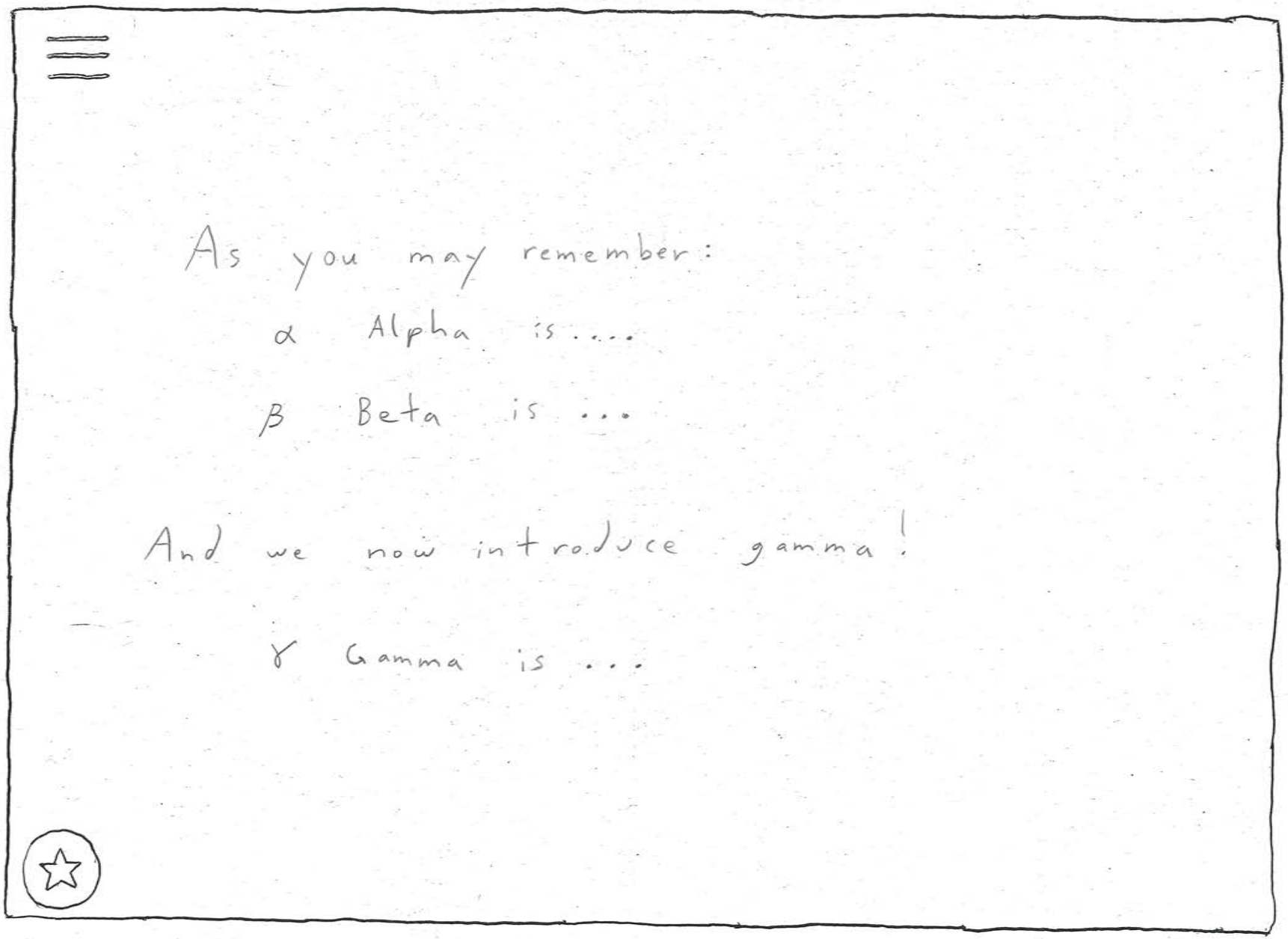
alablet


Throughout this quarter we will be using alpha and beta.
Alpha is ...
Beta is ...
— Can beta ever occur before alpha?
α is always first

a tablet



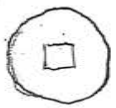
a tablet


As you may remember:
α Alpha is....
β Beta is ...
And we now introduce gamma!
γ Gamma is ...

a tablet

These new variables can be related and we can prove:

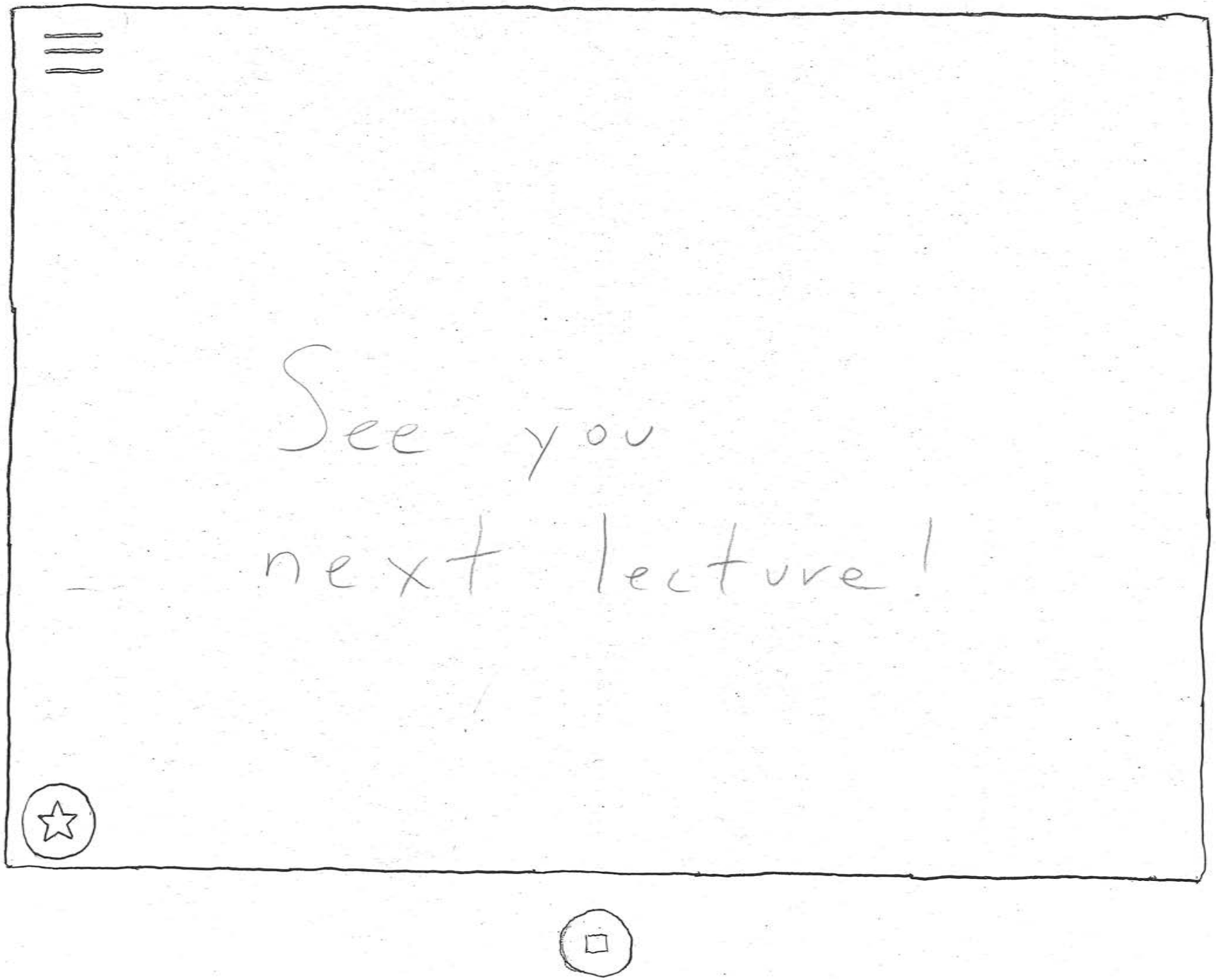
$$(\alpha + \beta)^{\sigma} - \gamma = 42$$



a tablet

We now have the basis for exploring the field of unusual equations.

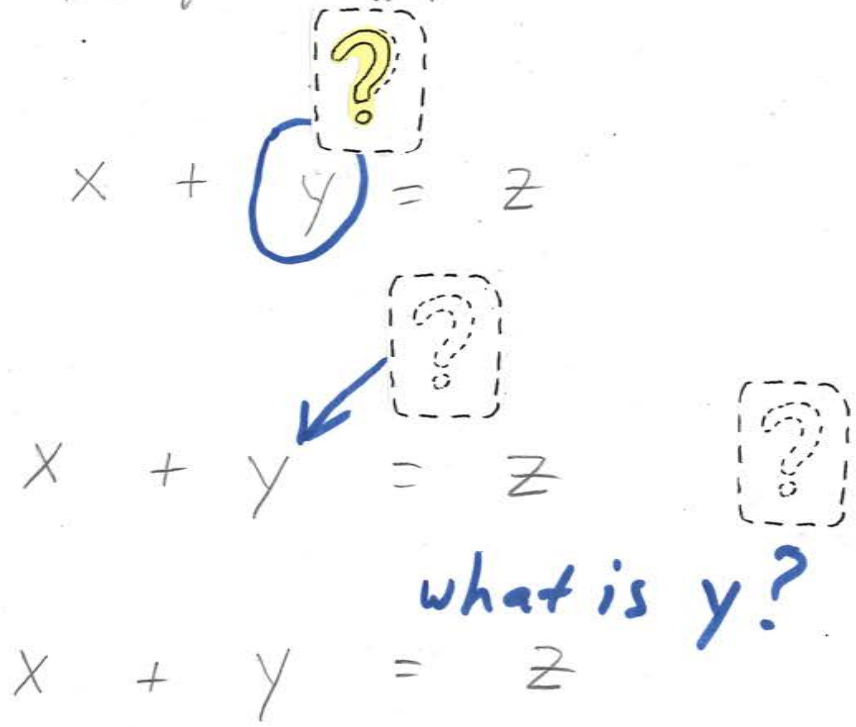
a tablet



How To Use

- Take notes directly on slides
- when you have a question, drag question mark icon into into the drop target that appears after you circle, arrow, or ask a question with your pen.

Example asking questions:



- To rate the slide, press the ster and tap or drag to selected rating

Drag me to your question

Question Submitted!

FC 102

Slides [ ]

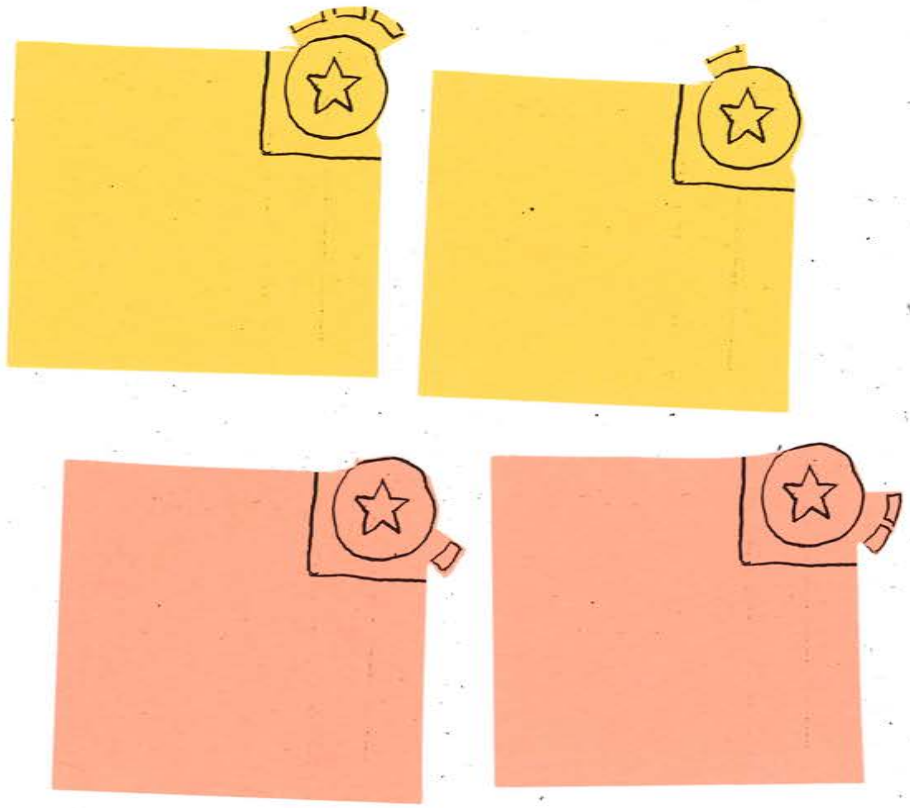
Lectures [ ]

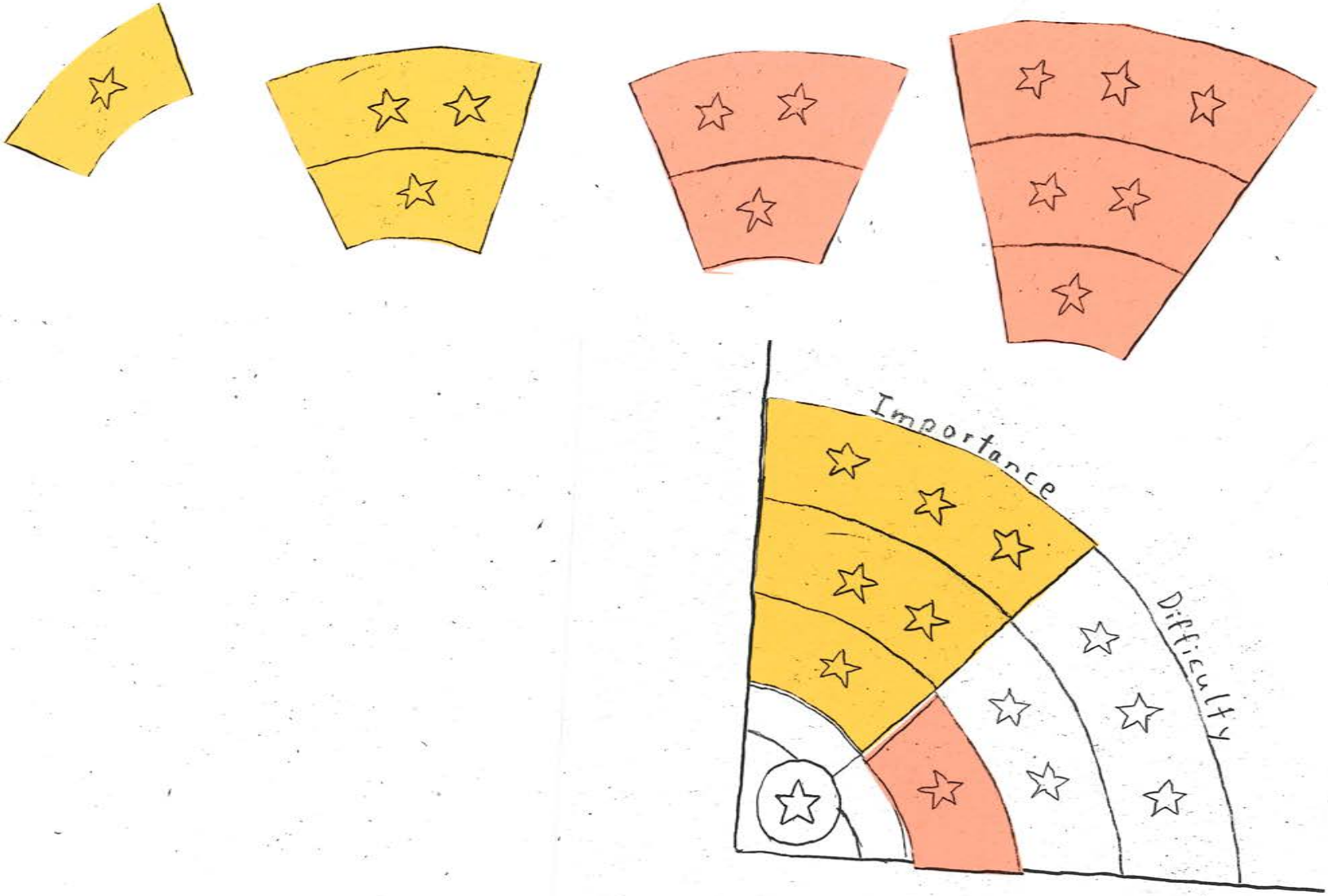
Classes

Pen Color

How To Use

Exit




Importance
Difficulty