PHY 121P
Mastery Self Pace Course
Spring 2016

Professor: Steven Manly

Dept. of Physics and Astronomy

University of Rochester

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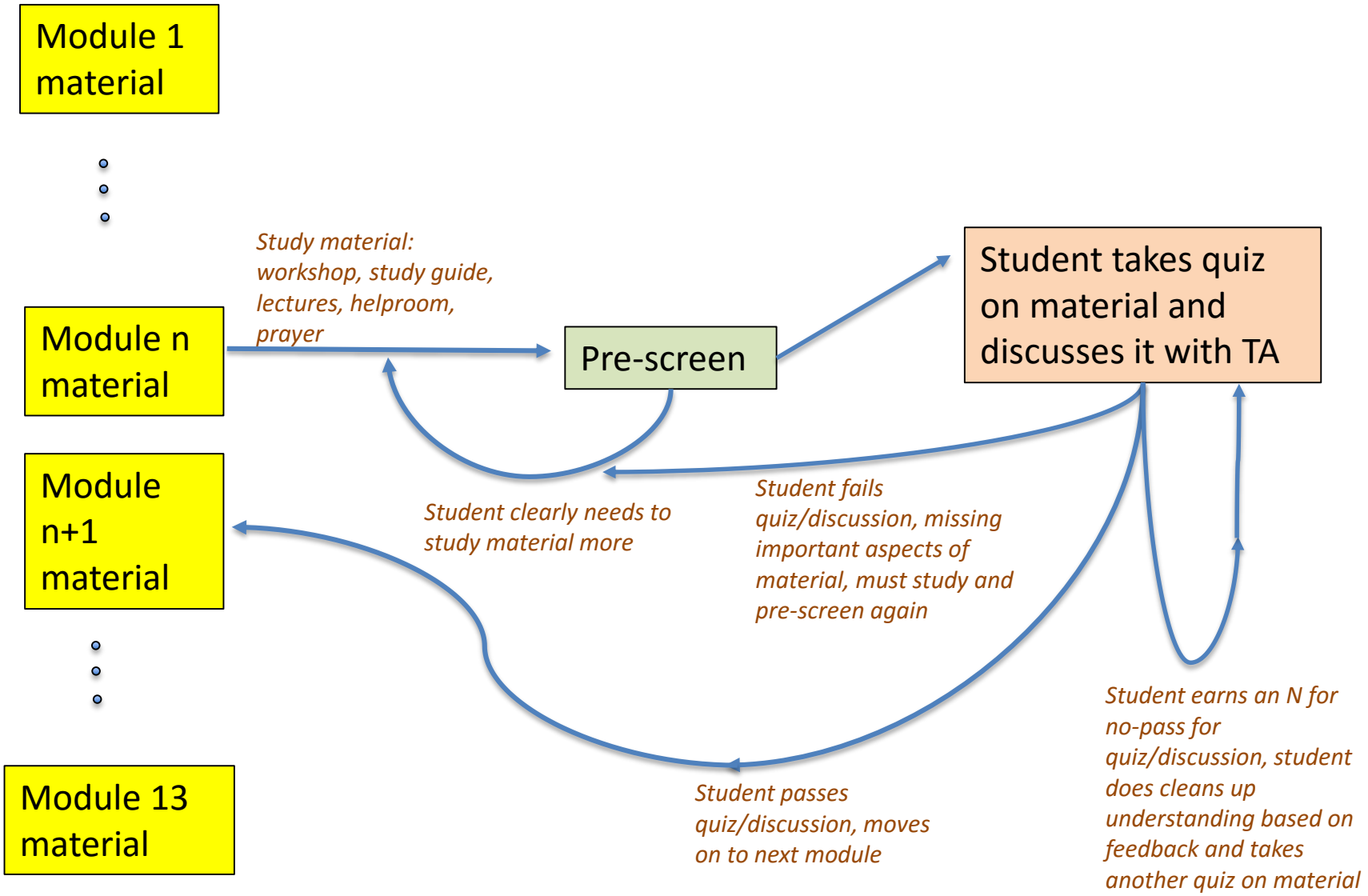
via phone: 585-275-8473 (email is better in general)
via feet: B&L 203E

pre·req·ui·site
prēˈrekwəzət/
noun
plural noun: **prerequisites**
a thing that is required as a prior condition for something else to happen or exist.

P121 and P121P Prerequisites

- PHY101 (Basic Math for Physics, 1 credit, pass/fail, must pass) and/or pass the BMA.
- MTH162 – Integral calculus (completion of MTH143).
- MTH162 can be taken concurrently with this class.
- If you are still taking MTH140-series math and you need introductory mechanics this term, you should be in PHY113
- If you have not satisfied these pre-reqs, you cannot take PHY121P (and you should be thankful for that ☺)
- Textbook: Fundamentals of Physics 10th edition (Halliday, Resnick, Walker). This is used for P121.
- For P121P, feel free to use the 8th edition.

PHY 121P – mastery/self pace course schematic



PHY 121P – mastery/self pace course, words

- The class material is broken into 13 separate modules.
- Students work linearly through the modules
- Students work on the material covered in a given module using the study guide and problems, textbook, regular P121 lecture, recorded lectures, and P121p workshops.
- When student thinks they understand the material, they demonstrate this to a TA (pre-screening).
- When passed pre-screen, student schedules a quiz.
- Student takes quiz.
- Quiz is graded and student given feedback by TA (IMPORTANT OPPORTUNITY TO LEARN).
- Student passes quiz if and only if they demonstrate a clear understanding of the material via quiz performance and discussion with TA.
- If student passes quiz, student moves on to next module.
- If student is getting much of the relevant material, but is missing something fundamentals they are given an "N" for "not passed". When this happens, the student needs to go away and work to understand what they are missing. This student is allowed to take another quiz on the same module without having to pre-screen again.
- If, in the quiz and the discussion, the student demonstrates to the TA that they do not understand most of the material in the module, they are given an "F" (fail) on that quiz and they must go work to understand what they do not understand (workshops, POA library help hours, textbook, outside lectures, etc.). This student must be pre-screened again before being allowed to take another quiz on the given module.
- In general, N or F does NOT mean student simply made a little error. It means student is missing something or a lot and must engage and understand the material.
- Students push to work through the modules by the end of the term.
- Fraction of modules passed combines with grade on final exam to yield final grade (more on this later)
- See http://www.pas.rochester.edu/~dmw/MSP/MSP_Physics.pdf for more details on the difference between PHY121 and PHY121P

Why are you in this class?

If you are here because you heard it was easier than regular P121 or because you think it will let you concentrate on your other classes or beer pong for the first month before starting work on this material

… please stand up so that I can laugh at you.

For many of you I suspect this class will require more work than the regular lecture course

This class is NOT for procrastinators and does not have much room for sliding by without understanding the material … that's the point.

Mastery – the power of this format is that we won't let you go very far without realizing what you don't know.

A problem: In standard physics lecture class, some students deceive themselves into thinking they understand more than they do, i.e., they don't know what they don't know. Given this, they don't work to fix it. Often they don't realize there is a problem until they get rocked on the second midterm exam.

In THIS class, if you don't understand the fundamental things in a given small section (module) of the class, we let you know and you have the opportunity to go back and figure it out before moving on. You can't move on until you achieve "mastery" of that material. In a sense, there is no partial credit here.

PHY 121 P

Mastery self-paced course

Self-paced! Awesome. I'll do it all on April 25!

Mastery? Yikes. It's a lot of hard material. I'm going to get to work this week!

PHY 121 P

Same folks on April 27

Can you believe it? They didn't have slots for me to take even the few module quizzes I left myself time to do.

Woohoo! Hard for sure. But we made it though!

Cast of characters

- Professor Yongli Gao is responsible for PHY121 class and lectures

ygao@pas.rochester.edu

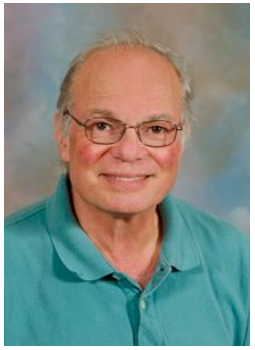
- Professor Steve Manly
  is responsible for PHY121P

steven.manly@rochester.edu

- 121P head TA: Mehreen Sultana

msultana@ur.rochester.edu

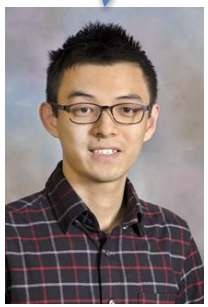
- Prof. Arie Bodek is responsible for the P121 labs



ariebodek@gmail.com

Lab administrator:
physlabs.mechanics@pas.rochester.edu

Cast continued



Ben Hall	bhall9@u.rochester.edu
Salah Mahmoudi	mmahmou2@u.rochester.edu
Bi Cheng Wu	bwu11@u.rochester.edu
Jingwei Jiang	jjiang9@u.rochester.edu
Surendra (Anil) Hazarie	shazarie@ur.rochester.edu
Owen Mannion	omannion@ur.rochester.edu
Hongzhe Zhou	hzhou21@ur.rochester.edu
Pouya Tanouri	ptanouri@u.Rochester.edu

BL 208 staffing

- 1 graduate or undergraduate TA in B&L 208 running workshop
- 1 graduate or undergraduate TA in B&L 208 doing prescreening and possibly helping with workshop.
- 1 (or 2) graduate TA(s) administers the quizzes and grades the quizzes once done in BL208B. The graduate TA provides the student the grade and feedback.

Lectures

- P121P lectures (MW 1525-1640) will not meet (except the one time on Wed., Jan 20) unless there is some exceptional reason why I feel we need to meet for a special discussion or lecture (will be announced in advance if it happens, do not expect it)

- PHY121P students are welcome attend the regular PHY121 Lectures by Prof. Yongli Gao **TR 9:40-10:55** in HOYT

- You will be provided links to previous Prof. Howell PHY121 lectures (video) and Prof. Manly's PHY113 lectures (very similar class, slides and audio)

- You are welcome to use resources you find on the web. Just make sure the level of formality is appropriate for this class. If you find something that is fabulous and really works for you, send me the link and I might share it with the class as a whole.

- Give it all a try and DO WHAT WORKS FOR YOU!

Module study guides

- You will find study guides for each module on BB.
- These are meant to be helpful guides to the material and provide some practice problems.
- Wise students will use them and do problems in an engaged fashion.
- Wise students will NOT think the guides are all they should use. The guides are not meant to give complete and full treatments.
- Wise students also read the text (ours and others) and study the example problems carefully.
- Wise students may also do more problems (e.g. the PHY121 homework problems) as needed.

Workshops

- Generally NOT a place to sit by yourself and ask the TA a question now and then.
- The P121p workshops are meant to be a version of peer-led group learning.
- Sit with students working on the same module and collaborate on helping each other understand the concepts and problems.
- The TA is there to facilitate this process. That will at times involve answering specific questions. Often it will involve giving a little guidance and asking you and your peers to discuss and figure it out amongst yourselves.
- This works best when the TA knows you and you work consistently with a group of your peers … in other words, go to your assigned workshop and engage with peers on the module concepts/problems.

What is a workshop at UR?

Institutionalized study group

Small group size (5-12)

Mix of abilities

Meet 2 hours once a week

Work together through problem set designed by professor

Trained peer leader (undergraduate) who facilitates

Comfortable, non-evaluative atmosphere

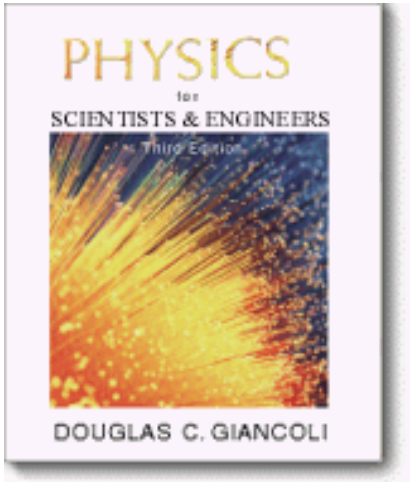
What do the students do in workshop for 2 hours/week?

- Work on the week's problems together as a group or in small subgroups
- Come to closure together on how to approach the problems (may be multiple approaches to discuss!)
- Work through shared and individual questions and misconceptions.
- Step back together and explore the process of solving/thinking through the problems … metacognition (thinking about thinking)

A long time ago in a classroom far, far away … P114 (non-physics and engineering science majors) split class experiment:

41 students randomly assigned to workshops

110 assigned to "typical" recitations



B- or better →

Students attending >5 workshops → 93%

Students attending recitations → 63%

➢ Similar results in the following years (also in Physics 121) – not split classes, but grade success correlates strongly with attendance *and engaging in the model properly*

Workshops continued

- There are ~13 different P121p workshop sections (you are signed up for one of those sections).
- The workshops vary somewhat in length for historical (registrar scheduling timeslot) reasons. They are not intended to be different.
- Feel free (you are encouraged) to work on the course material outside of workshop.
- You are strongly encouraged to go to your assigned workshop section and engage with a group via workshop methodology. A TA will facilitate your group/work.

Workshops continued

- Workshops are primarily for steady engaged group work with your peers and TA's
- You really just want a few quick questions answered? We prefer you not interrupt workshops. Go to the Physics & Astronomy library help hours run by the Society of Physics Students

  (7-9 pm, most days, exact schedule TBA)

Workshops continued

- You are encouraged to attend your assigned workshop regularly and you are free to attend any additional workshop as needed/useful.
- You are asked to join workshops at the beginning of the workshop time slot. If you join late and try to interrupt the operating workshop, you'll be asked to leave and come back at the start of another workshop.
- You must check in with the TA when you join the workshop.
- Attendance is tracked. Each week that you attend at least one workshop, you will get one workshop credit.
- If you receive 8 or more of the possible 13 workshop credits, and you are one point below a grade point boundary in the final grade curve, you will receive the higher grade.
- If you complete 13 modules before the 8^{th} week, you will get credit for the 8 workshops.

Workshops continued

- Workshops not effective if too many people.
- Workshops each capped at 20 students. Students who are officially signed up for the section are given priority. "Walk-in" students are allowed to attend on a first-come first-served basis up to 20 students.
- Workshops/pre-screens/quizzes going on roughly

  M 2-10, T 2-10, W 6-9, R 2-7:20, F 2-6
- Workshops end at 10 pm even if your scheduled section timeslot goes past 10 pm.

121P Weekly TA/TI Schedule

Section	Monday	Tuesday	Wednesday	Thursday	Friday
Afternoon	2:00 - 4:40 15/15. Surendra Hazarie . Owen Mannion . Hongzhe Zhou .	2:00 - 4:40 12/15 . Surendra Hazarie. Owen Mannion . Jingwei Jiang .	N/A	2:00 - 4:40 15/15. Owen Mannion . Jingwei Jiang . Hongzhe Zhou .	2:00 - 4:00 7/15. Owen Mannion . Bi Cheng .
Evening	4:40 - 7:20 13/15 . Surendra Hazarie . Pouya Tanouri . Salah Mahmoudi .	4:40 - 7:20 15/15. Surendra Hazarie. Ben Hall . Hongzhe Zhou .	6:00 - 9:00 14/15 . Hongzhe Zhou . Salah Mahmoudi . Ben Hall .	4:40 - 7:20 7/15. Owen Mannion . Jingwei Jiang . Hongzhe Zhou .	4:00 - 6:00 6/15. Owen Mannion . Jingwei Jiang .
Night	7:20 - 10:00 9/15 . Surendra Hazarie . Pouya Tanouri . Jingwei Jiang .	7:20 - 10:00 11/15. Surendra Hazarie Hongzhe Zhou . Bi Cheng .	N/A	N/A	N/A

- Section times do not map perfectly onto the registrar times you signed up for.
- Go to one that best agrees with your official section, flex where you can/need.
- Can go to other times as needed provided not too many students in the room.

Exams

- PHY121P has no midterm exams.
- PHY121P has a final exam (will be identical to and in the same time/location as the final exam for PHY121).
- TIME/LOCATION of the PHY121/PHY121p final exam TBA (don't buy your plane tickets yet!)
- P121p students take quizzes for each module instead of taking midterm exams
- For a student completing all modules, this is a minimum of 13 quizzes (often it takes more than one try, we plan for an average of ~2 quizzes/module/student … exact number not settled yet)

Quizzes and prescreens

- To pass a module of the class and move on to the next, you must demonstrate your mastery of the material by passing a quiz on that material.
- You should read the text and work though the study guide problems and get your questions answered BEFORE attempting to take a quiz for a given module.
- Before scheduling a quiz on the material in a new module, you are interviewed by the “pre-screening” TA at the back of the workshop room. You must demonstrate to this TA a reasonable understanding of the material in the module or you will not be allowed to schedule a quiz.
- If you pass the pre-screen, you can schedule a quiz. (See next slide on how to do this.)
- Each quiz is 2-3 problems. Expect quizzes to take you 20-40 minutes. Stay as long as you need up to the end of the workshop schedule during the day (no need for extra time accommodation as it is already there).
- After finishing the quiz, a TA will grade the quiz and discuss it with you. You will receive a grade of F (fail, you must study more and pre-screen again before scheduling another quiz), N (not passed, you need to study more and can schedule another quiz without pre-screening again), P (pass, go to next module).

Quizzes and prescreens

- We have multiple, different quizzes on each module. The idea is that you take quizzes until you demonstrate mastery by passing one.
- In practice, the number of quizzes is limited and we will not let you "take them until you find one you can pass". Work to understand the material and make them count.
- It is less efficient time-wise for you to rush to take quizzes and fail and have to repeat them than it is for you to prepare properly in the first place.
- If you get an N on your first quiz on a module, you can reschedule a new quiz ASAP. (But, please take the feedback into account and study in the interim.)
- If you get an N or F on the second quiz on a module, you will need to pre-screen again and you should expect the pre-screening to be harder. You will also need to wait at least one day before taking the third quiz in that module. (The idea here is that you have gotten some feedback and you know you are not understanding something in the material. FIX that before you come back to take another quiz.
- If you do not pass your 4^{th} quiz on a given module, you will have to make an appointment and be interviewed by Prof. Manly before proceeding in the course. He'll ask questions and may give you other problems to do and explain to him. Then he'll decide what to do. Typical things he might do are pass you to the next module or help you figure out what you don't know and give you additional reading/problems/study strategies to help you learn it before taking a fifth quiz.

Scheduling a quiz

- The first method (**Just in Time Scheduling)** is straight forward. If a student who has be pre-screened observes there is an open spot on the exam schedule they can just walk in and take the exam without any formal scheduling.

- The second method **(Immediate Scheduling**) can occur as soon as the student has finished the Prescreen. The workshop leader at the end of the Prescreen can offer the student the opportunity to schedule an exam time

- If you do not wish to schedule an exam after the pre-screen you can try you luck with the Just in Time Scheduling or send an email for remote scheduling.

- **Remote Scheduling**. Send Mehreen Sultana (msultana@ur.rochester.edu) an email. We will need your full name, student ID number, the module number for the exam you wish to take, and also you top three preferences for when to take the exam

Pace – "self-paced" is a little misleading

Jan 13 Jan 18	Week 0 Week 1	Chapter 1 (Measurement) and Chapter 2 (Motion Along a Straight Line), **Jan 20 MLK Holiday (no classes)** **Module 1**
Jan 25	Week 2	Chapters 3 (Vectors) and Chapter 4 (Motion in 2 and 3 Dimensions) **Module 2**
Feb 1	Week 3	Chapters 5 (Force and Motion I) and first half of chapter 6 (Force and Motion II) **Module 3**
Feb 8	Week 4	2nd half of Chapters 6 (Force and Motion II) and all of Chapter 7 (Kinetic energy and Work) **Module 4**
Feb 15	Week 5	Chapter 8 (Potential Energy), Chapter 13 (Gravitational Potential energy) & Chapt 9 (Center of mass) **Module 5**
Feb 22	Week 6	Chapter 9 (Momentum & Collisions) **Module 6**
Feb 29	Week 7	Chapter 10 (Rotation) **Module 7**
Mar 7		**Spring break NO CLASSES**
Mar 14	Week 8	Chapter 11 (Rolling, Torque & Ang. Mom.) **Module 8**
Mar 21	Week 9	Chapter 13 (Gravitation) **Module 9**
Mar 28	Week 10	Chapter 14 (Fluids) **Module 10**
Apr 4	Week 11	Chapter 15 (Oscillation) **Module 11**
Apr 11	Week 12	Chapter 16 (Waves I) **Module 12**
Apr 18	Week 13	Chapter 17 (Waves II) **Module 13**
Apr 25	Week 14	Half a week – no workshops, **just QUIZZES**

Fixed number of quiz slots available each week.

Physics does not cram well. Much better to give brain gel time to sort it out.

Even if you are mutant and can cram physics, you may not find the quiz slots available at end of course.

We can't change that. There is no $/manpower to allow an increase in quizzing/workshop help at the end of the term.

Don't procrastinate.

Pace – “self-paced” is a little misleading

- Add/drop date is Feb. 9
- This course breaks if many of you procrastinate and fall way behind pace.
- Your ability to catch up breaks if you fall way behind pace.
- Statistics for how all students are faring will be sent to you each week.
- By week of Feb. 1, students who are not off to a decent start will have to chat with Prof. Manly and/or engineering advisors to continue in the course. (By then you should be working on module 3 or quizzing on module 2.)

Labs

- You must complete/pass the P121 mechanics labs to pass this course.
- PHY121P lab website is http://www.pas.rochester.edu/~physlabs/
- Labs run in a two-week cycle (A week then B week)
- Labs begin with group A on Jan. 25
- First group B lab is week of Feb. 1
- Lab questions/issues? I'm not your guy. Labs run by Prof. Bodek. Most issues should go to lab administrator at physlabs.mechanics@pas.rochester.edu

Lab lecture

- The one and only lab lecture will be on statistics. It will take place Friday, January 15, 2016 at 3:25 in Hutch 141

- Hope you were there. Will try to get copy of lecture posted on BB … probably on the lab website already

Quiz grades

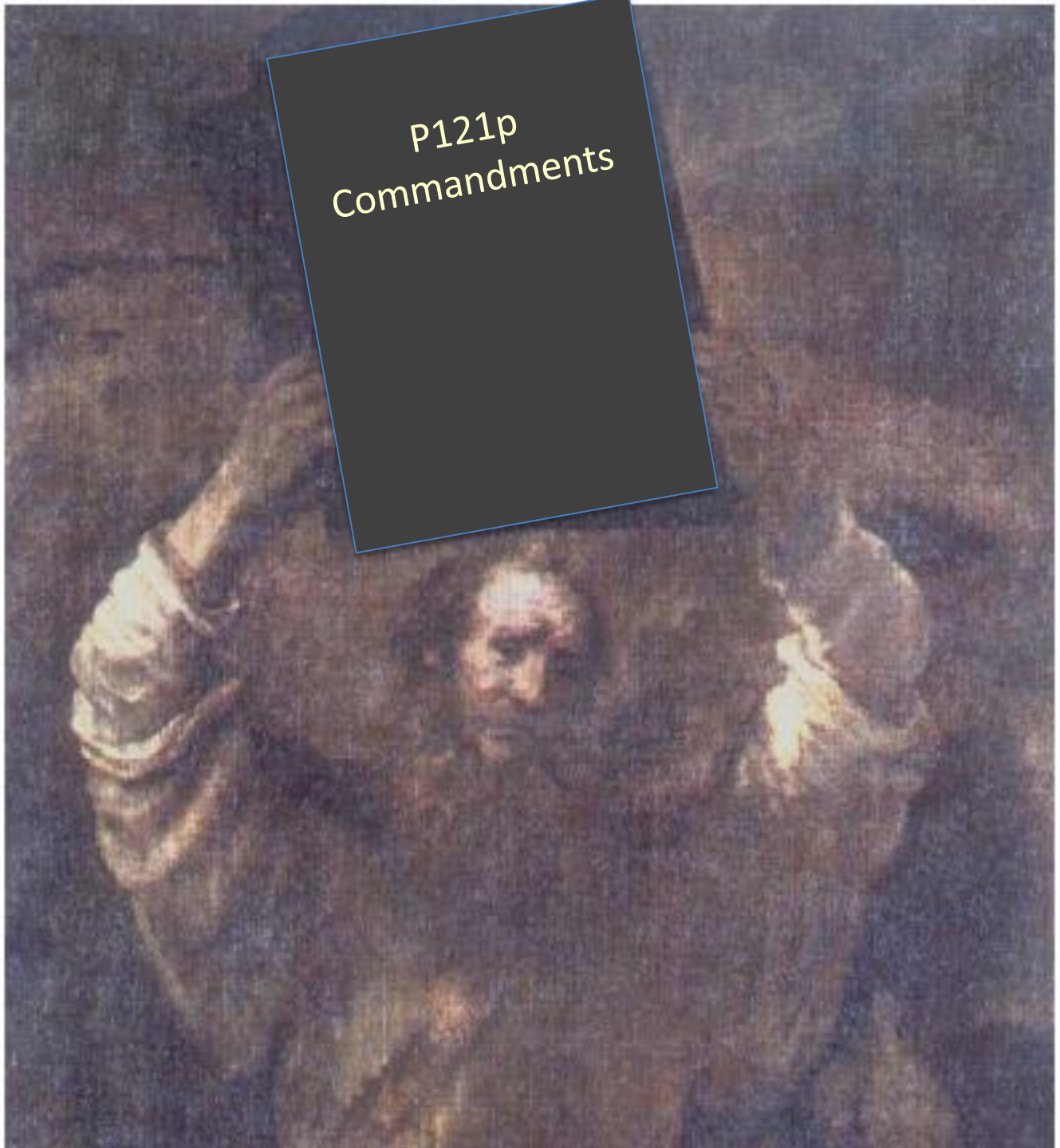
- Quizzes count for 65% of the grade. The grade is just the fraction of quizzes that were passed.
- If a student completes all 13 modules, he/she get a 13/13 = 100% for the quiz part of the grade.
- If a student is two modules behind at the end of the course, he/she gets 11/13 = 85% for the quiz part of the grade (which counts 65% of the final grade).
- At the end of the class, if you have taken and failed a quiz on the next module, it counts as 0.3 of a module. If you have taken and received an N on the next module, it counts as 0.7 of a module.
- For example, a student finishes the course having passed 9 modules and earned an N on the last quiz they took for module 10, their quiz grade is 9.7/13=74%

P121p Grades

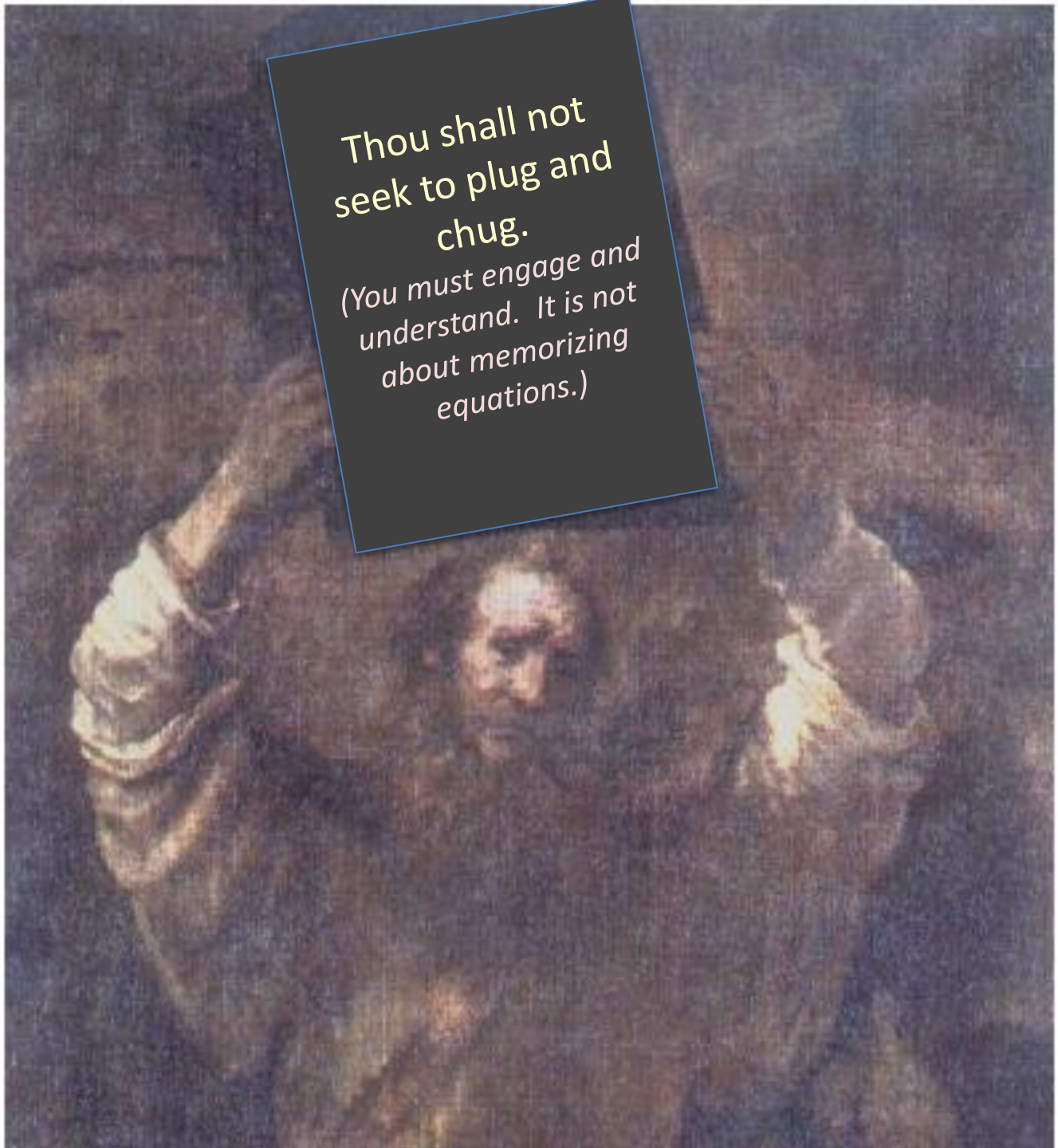
- Your numerical grade average is made up of 65% quiz grade + 25% final exam grade + 10% lab grade (5% from prelab and 5% from postlab)
- Manly calculates these numerical grades and places grade point boundaries on the distribution. For a normal class, expect the mean to be roughly a B. That distribution may slide up or down a little depending on whether prof thinks your class is normal or particularly strong or weak.
- If you attend one workshop during at least 8 of the full weeks (counting week with MLK day), and your grade is one point below a grade point boundary in the final curve, your grade will be bumped up to the higher grade.
- These numbers are defined as rounded to nearest integer using Prof. Manly's laptop/version of Excel.

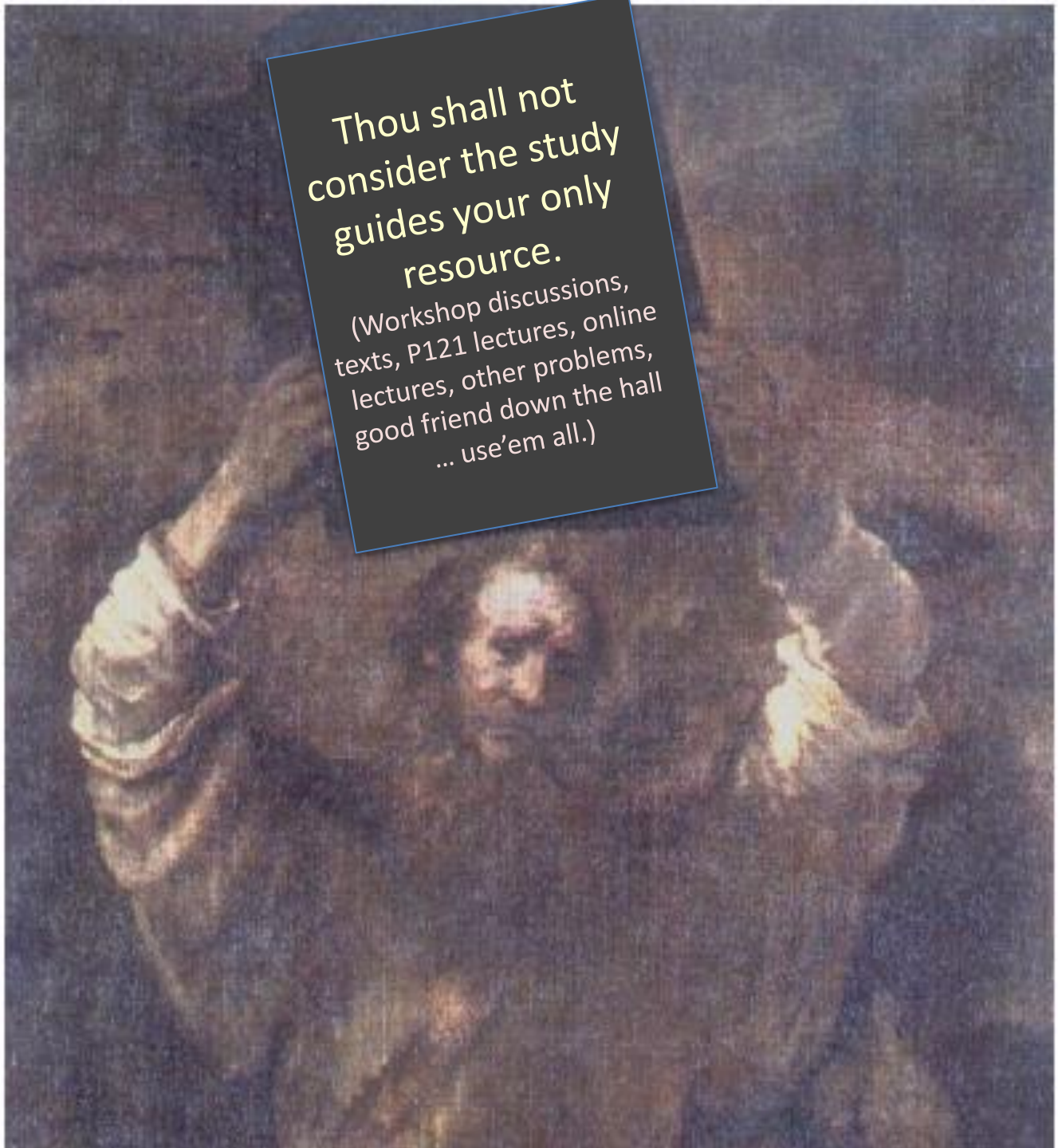
P121p Grades

- Regardless of your end numerical average, you must pass 7 modules to pass the class.
- Passing 7 modules does not guarantee you pass the class since both the labs and final exam factor in.
- Double jeopardy: that material you do not cover in the modules will be on the final exam anyway … another reason NOT to procrastinate.

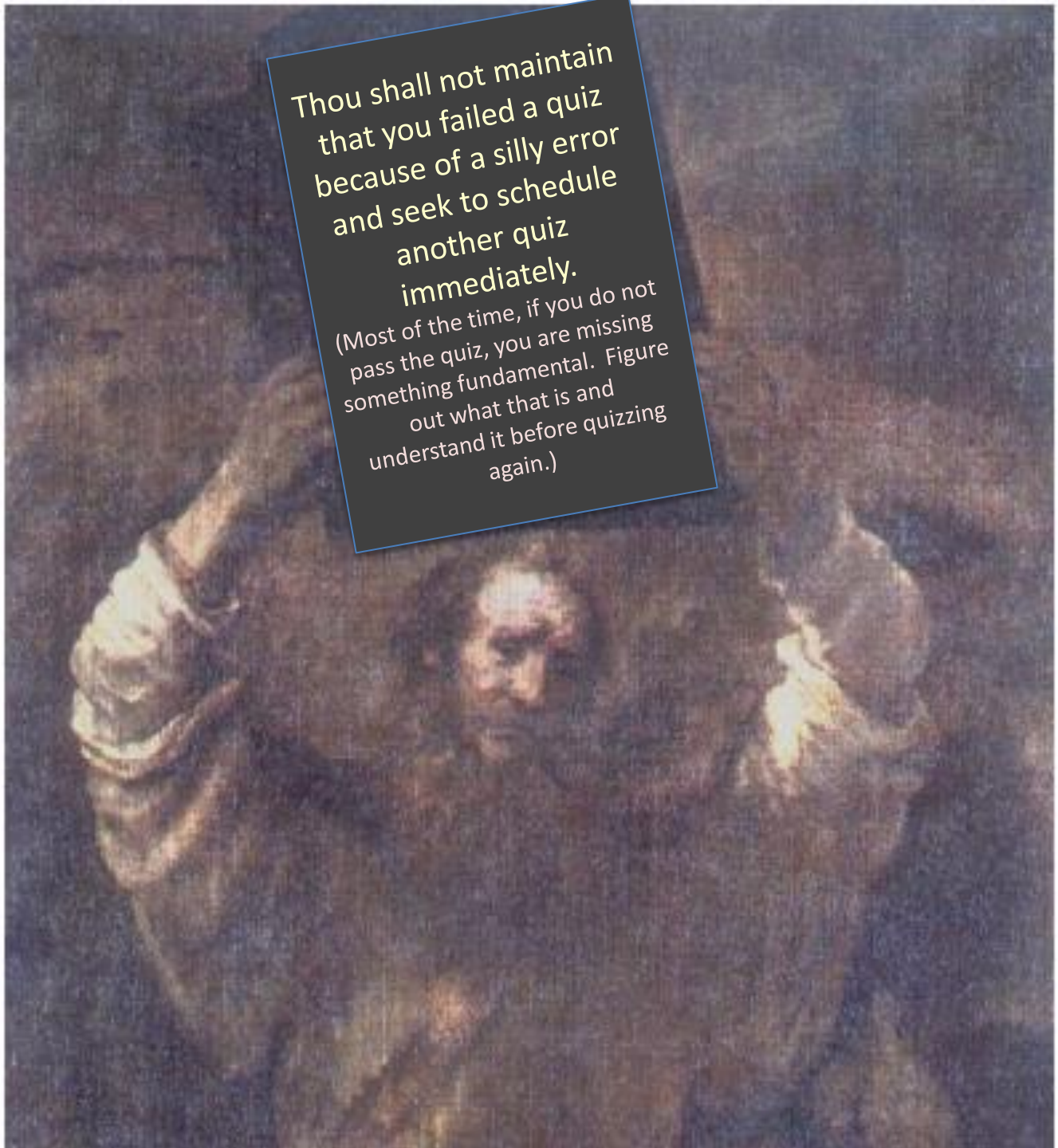

P121p
Commandments


Thou shall not procrastinate.
(The quiz and workshop schedule are fixed and will not change at the end of the term so you can catch up.)

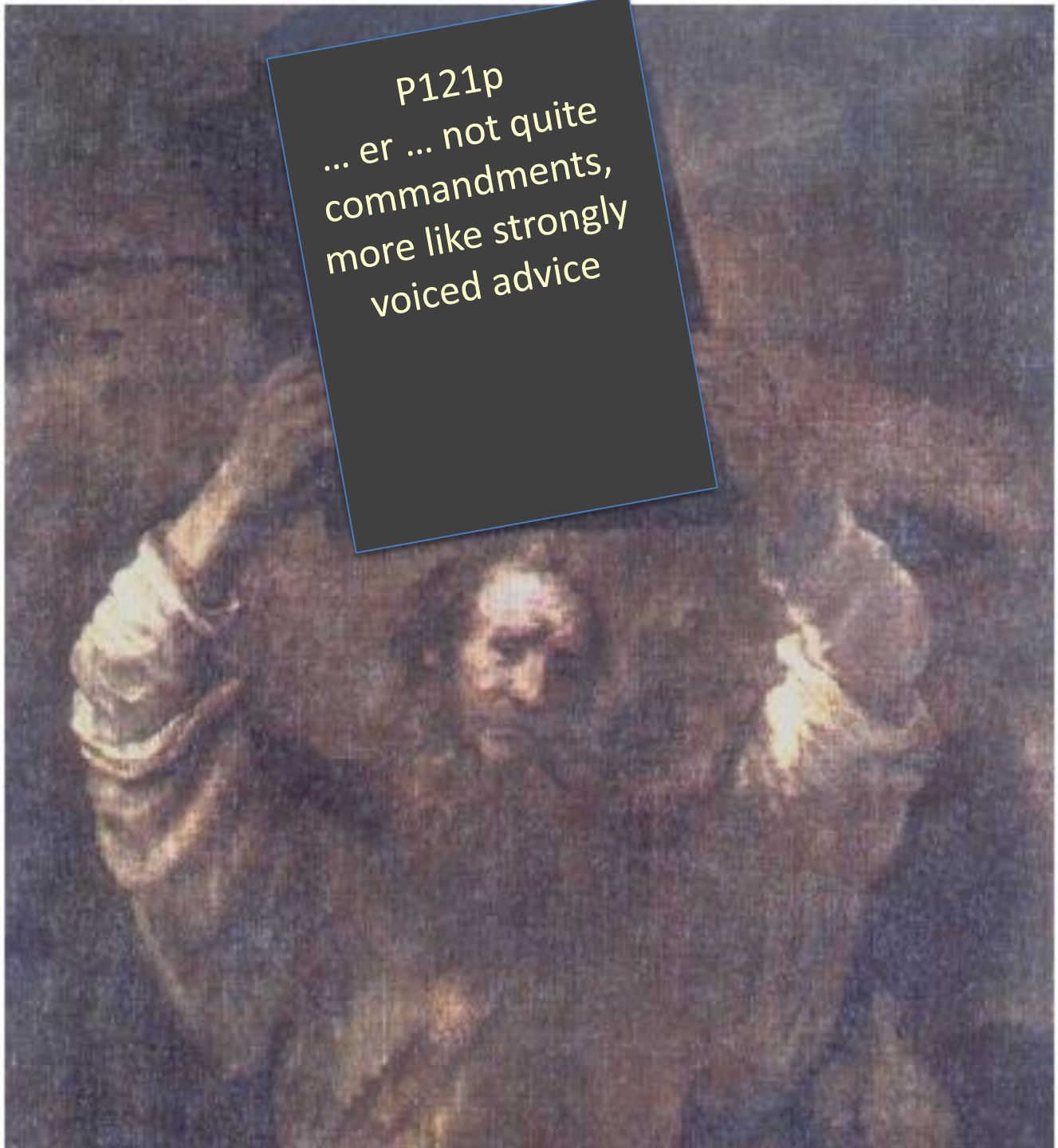

Thou shall not seek to plug and chug.
(You must engage and understand. It is not about memorizing equations.)

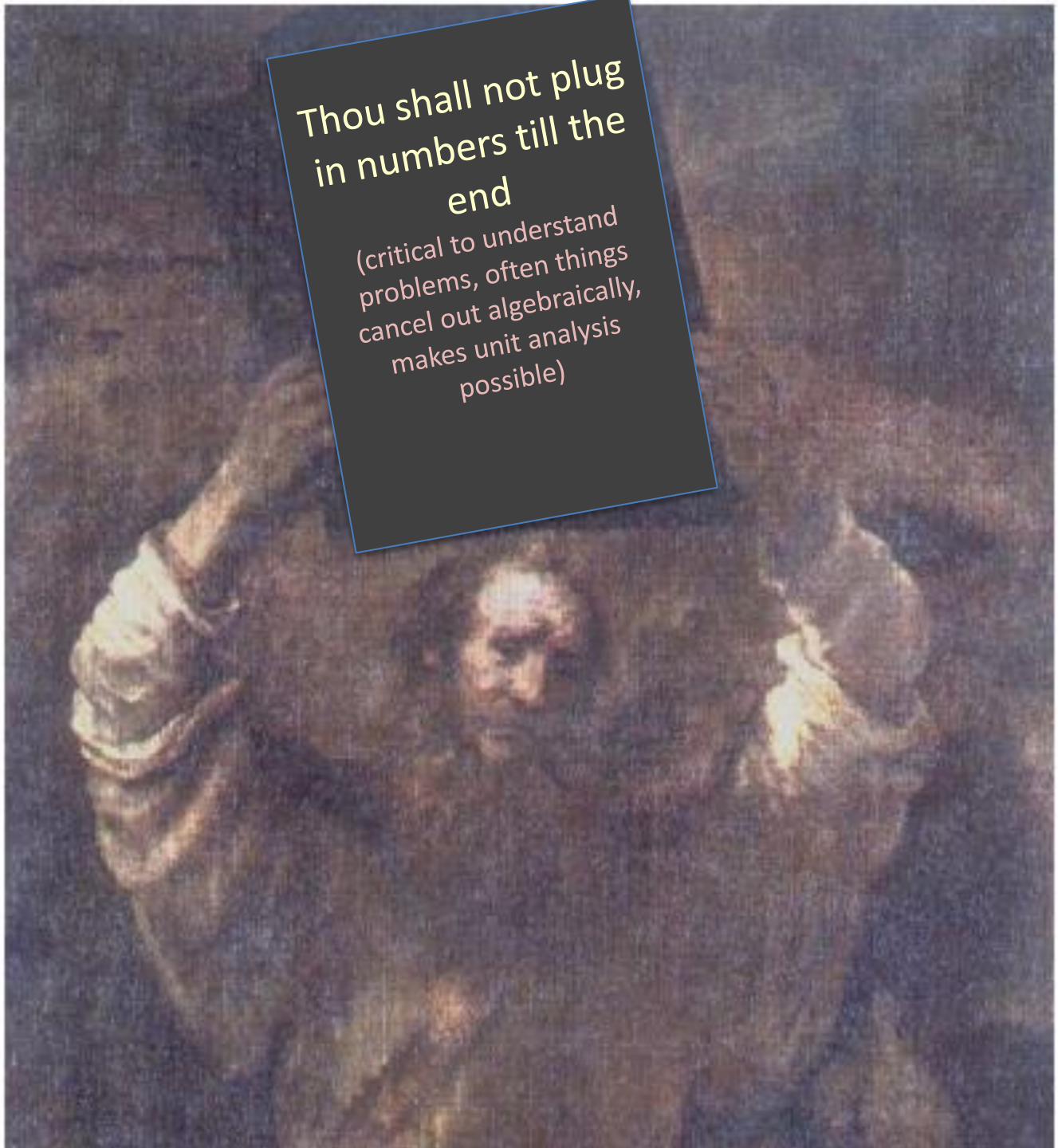

Thou shall not consider the study guides your only resource.
(Workshop discussions, texts, P121 lectures, online lectures, other problems, good friend down the hall … use'em all.)

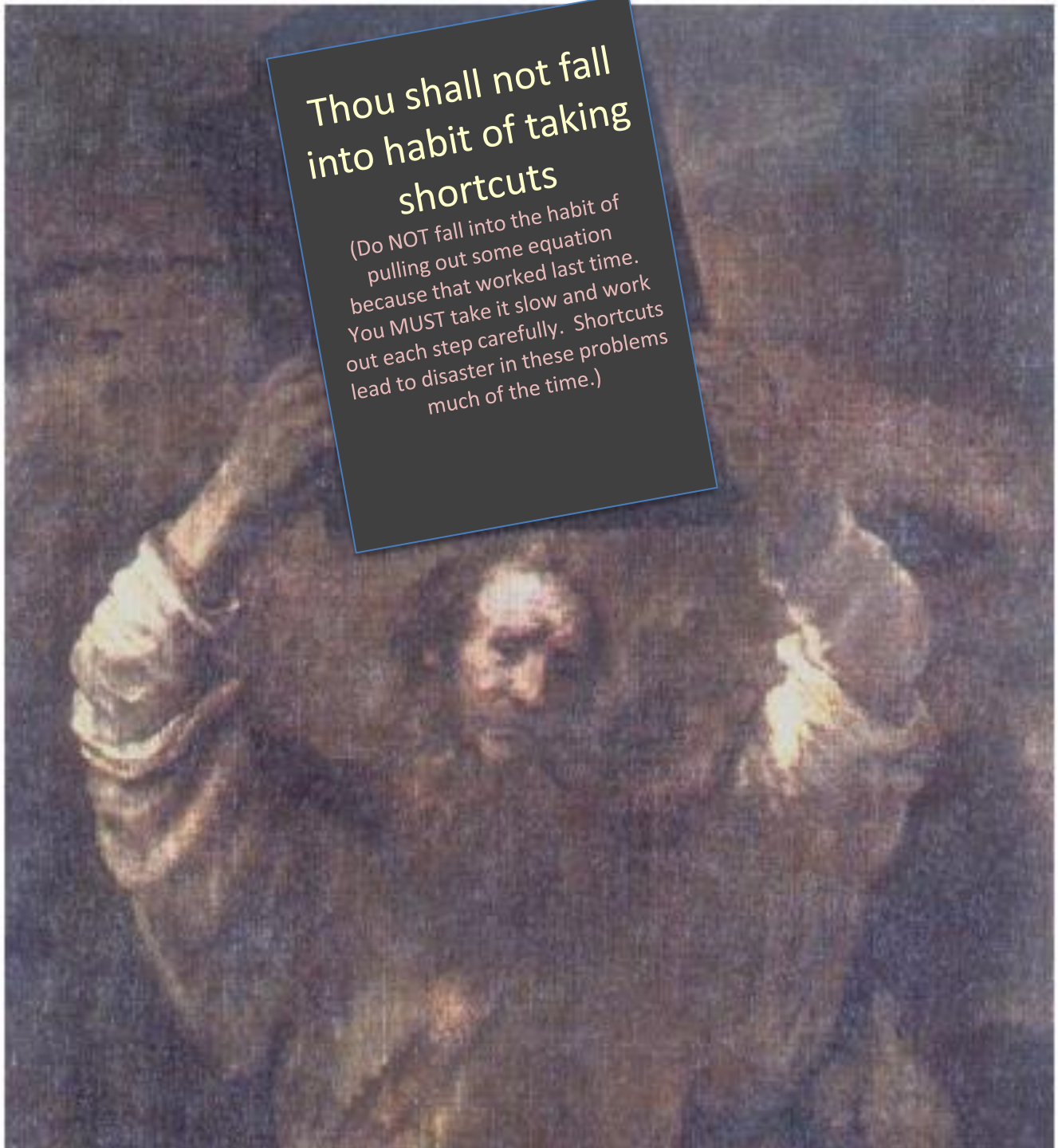

Thou shall strive to use peer-led group learning pedagogy in workshop

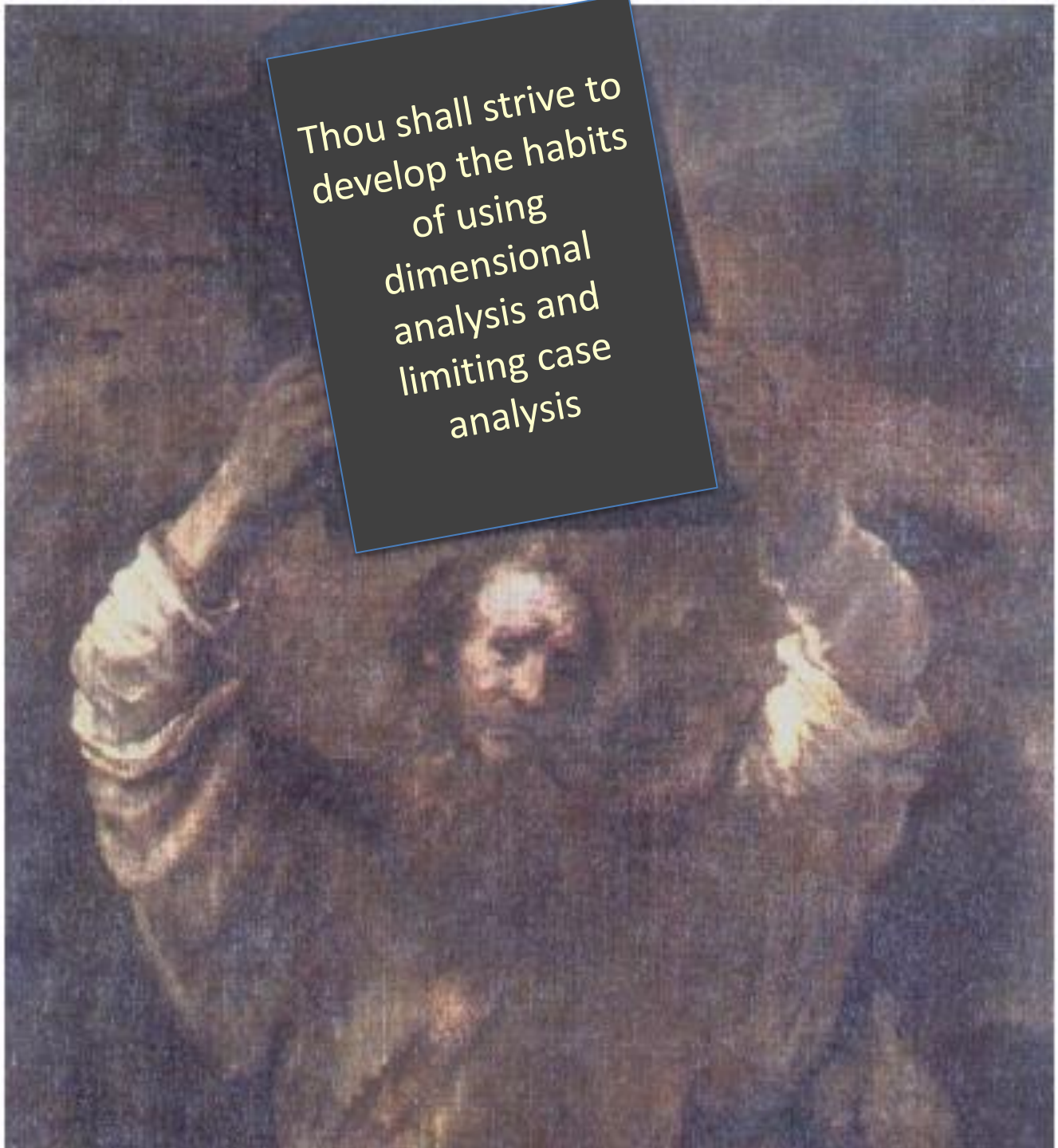

Thou shall not maintain that you failed a quiz because of a silly error and seek to schedule another quiz immediately.
(Most of the time, if you do not pass the quiz, you are missing something fundamental. Figure out what that is and understand it before quizzing again.)


Thou shall treat the TA's with respect.
(If you have an issue/complaint, bring it to ME.)


P121p
… er … not quite
commandments,
more like strongly
voiced advice


Thou shall not plug in numbers till the end
(critical to understand problems, often things cancel out algebraically, makes unit analysis possible)


Thou shall not fall into habit of taking shortcuts
(Do NOT fall into the habit of pulling out some equation because that worked last time. You MUST take it slow and work out each step carefully. Shortcuts lead to disaster in these problems much of the time.)


Thou shall strive to develop the habits of using dimensional analysis and limiting case analysis