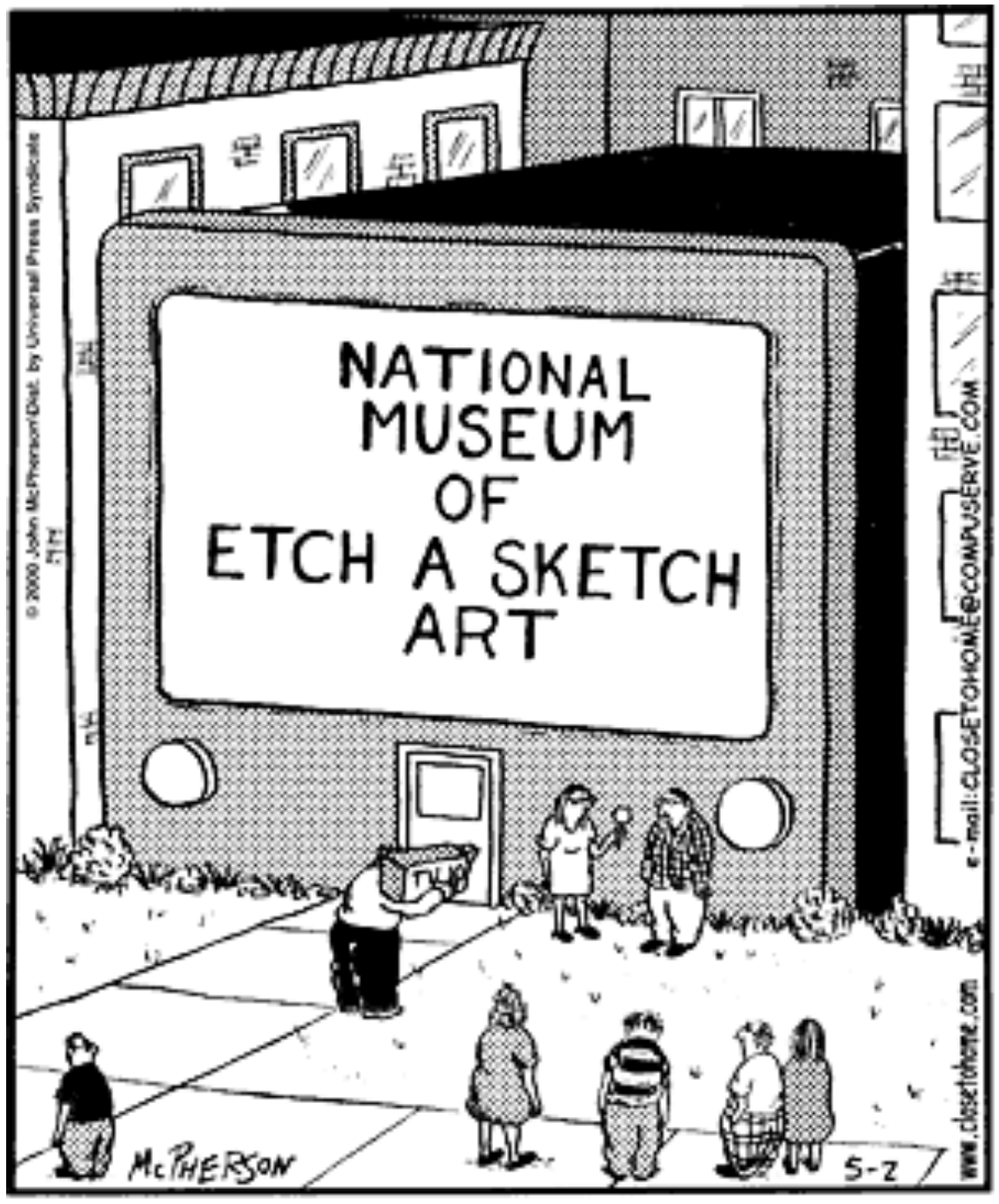
# Physics 220

On the 3 x 5 card, please write

1.Preferred name
2.Your hometown
3. Interests, hobbies, major
4. Some interesting/funny facts about yourself that you don't mind sharing with the class.

Share what you wrote with someone around you. In a moment, I'll ask you to introduce someone else.

Hand in your card before you leave today.




"Structurally, the building is fine. But sadly, the earthquake destroyed all of our art pieces."

# Physics 121: Principles of Physics

## Who am I?

Lance Nelson

Rigby, Idaho

Computational Physics
Materials Physics

"Why things break" by Mark Eberhart

I like to play handball
but I'm not very good.

What's handball?

# Course Structure (Schedule)

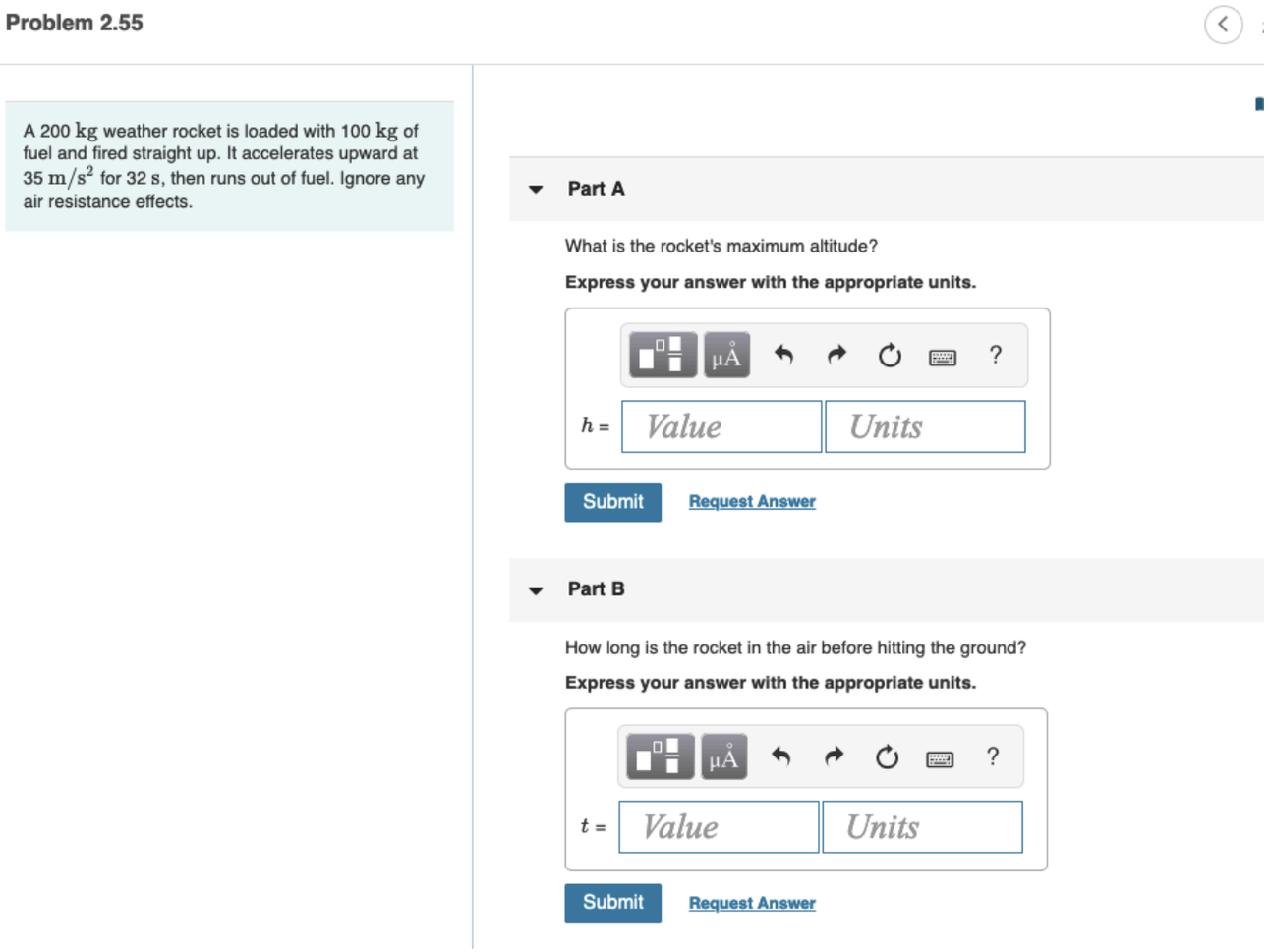
- Schedule Found on iLearn
- Alternating lecture and homework days.
- Warm-up quizzes (lecture days)
- Participation Evaluations (homework days)
- Mondays we will review previous week's quiz!

Sep

| Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|
| **14** Day **01**: Intro to PH220<br>**Reading: Syllabus** | **15** Day **02**: Charge, Insulators, Conductors<br>**Reading: 25.1–25.3** | **16** | **17** Day **03**: Coulomb's Law, Electric Fields<br>**Reading: 25.4–25.5** | **18** |
| **21** Day **04**: Continuous charge distributions<br>**Reading: 26.1–26.3** | **22** (HW 1)<br>Week 2 quiz opens | **23** Day **05**: Special Geometry Objects<br>**Reading: 26.4** | **24** | **25** Day **06**: Parallel-plate capacitor; Particles in Fields<br>**Reading: 26.5–26.7**<br>Week 2 quiz due |
| **28** | **29** Day **07**: Electric Flux<br>**Reading: 27.1–27.3**<br>(HW 2)<br>Week 3 quiz opens | **30** | **1** Day **08**: Gauss's Law<br>**Reading: 27.4–27.6** | **2** Week 3 quiz due |

# Homework

- Two components: paper-and-pencil and numerical.
- Always due on Tuesday (end of day)
- Homework problems found on Pearson website.
- You pick the problems; 15 points for full credit. (I'll give suggestions)
- You fill out the grading rubric.



**Problem 2.55**

A 200 kg weather rocket is loaded with 100 kg of fuel and fired straight up. It accelerates upward at 35 $m/s^2$ for 32 s, then runs out of fuel. Ignore any air resistance effects.

**Part A**

What is the rocket's maximum altitude?

**Express your answer with the appropriate units.**

$h =$ *Value* *Units*

Submit Request Answer

**Part B**

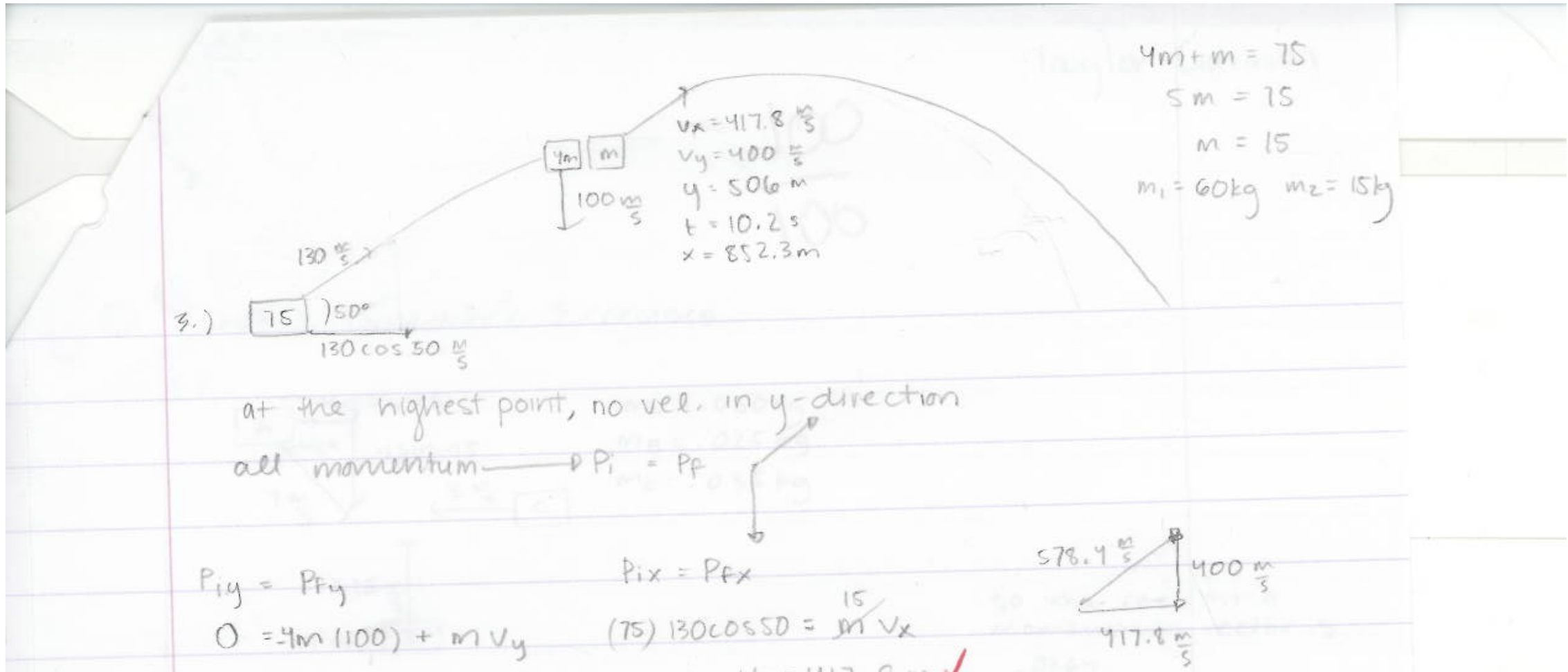
How long is the rocket in the air before hitting the ground?

**Express your answer with the appropriate units.**

$t =$ *Value* *Units*

Submit Request Answer

# 3D-BE-SNUB




at the highest point, no vel. in y-direction

all momentum ⟶ $P_i = P_f$

$P_{iy} = P_{fy}$

$0 = -4m(100) + mv_y$

$(60)(100) = 15v_y$

$v_y = 400 \frac{m}{s}$ ✓

$P_{ix} = P_{fx}$

$(75)\,130\cos 50 = 15 v_x$

$v_x = 417.8 \frac{m}{s}$ ✓

for first interval before explosion:

$v_{fy}^2 = v_{iy}^2 + 2a\Delta y$

$\Delta y = \frac{0 - (130\sin 50)^2}{2(-9.8)} = 506$ ✓

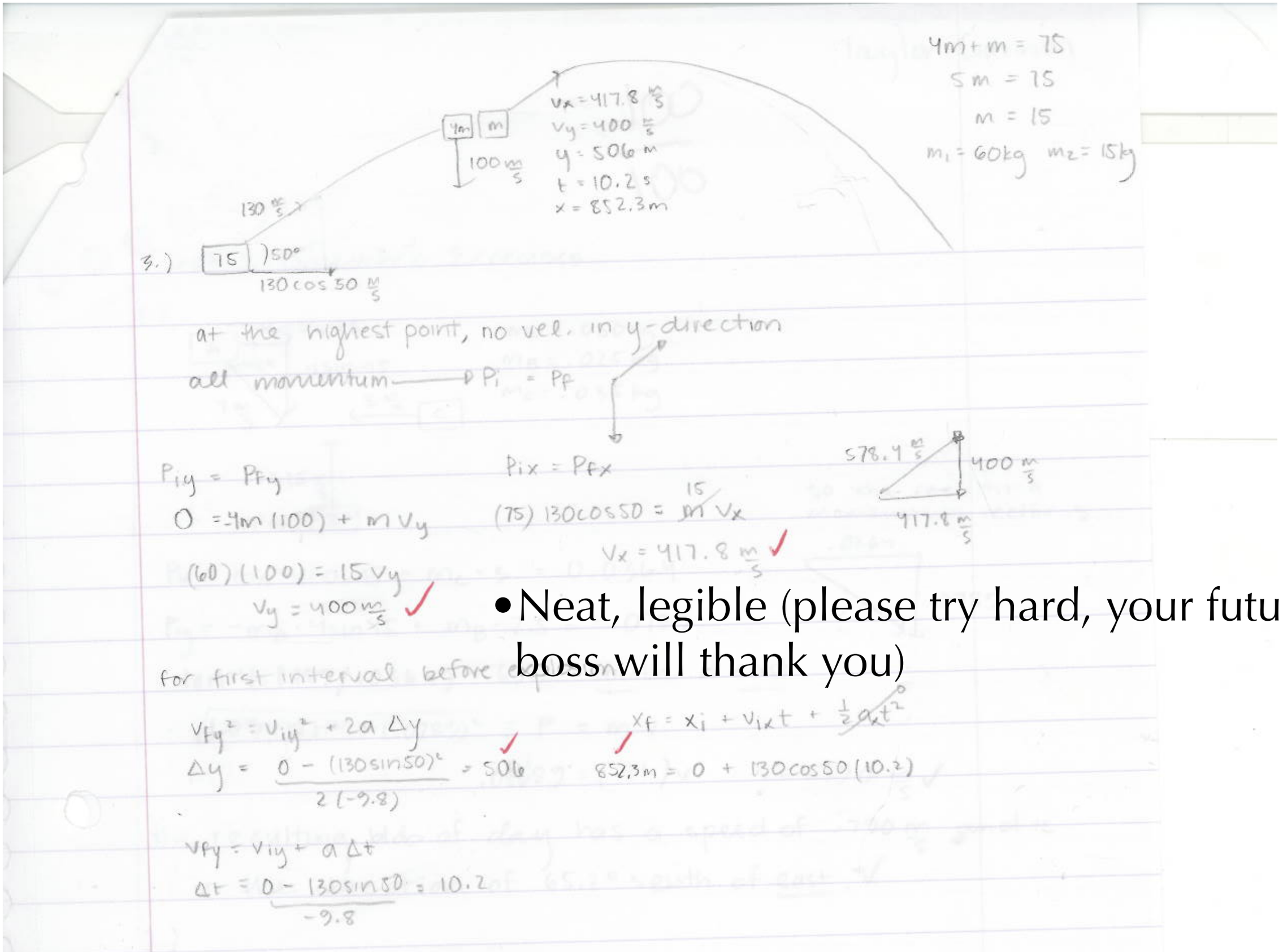
$x_f = x_i + v_{ix}t + \frac{1}{2}a_x t^2$

$852.3m = 0 + 130\cos 50\,(10.2)$ ✓

$v_{fy} = v_{iy} + a\Delta t$

$\Delta t = \frac{0 - 130\sin 50}{-9.8} = 10.2$

# 3D-BE-SNUB




- Neat, legible (please try hard, your future boss will thank you)

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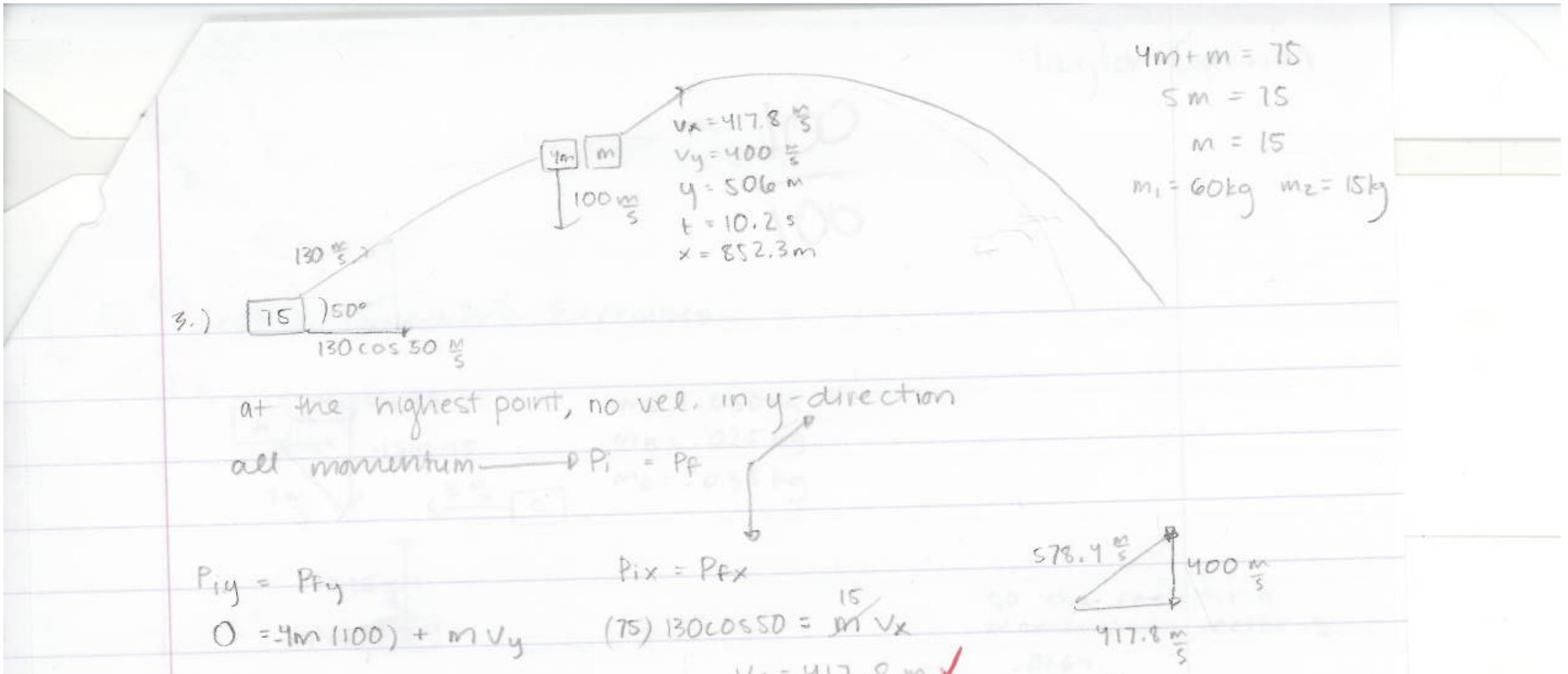


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- Used sufficient space (not crammed into two lines)

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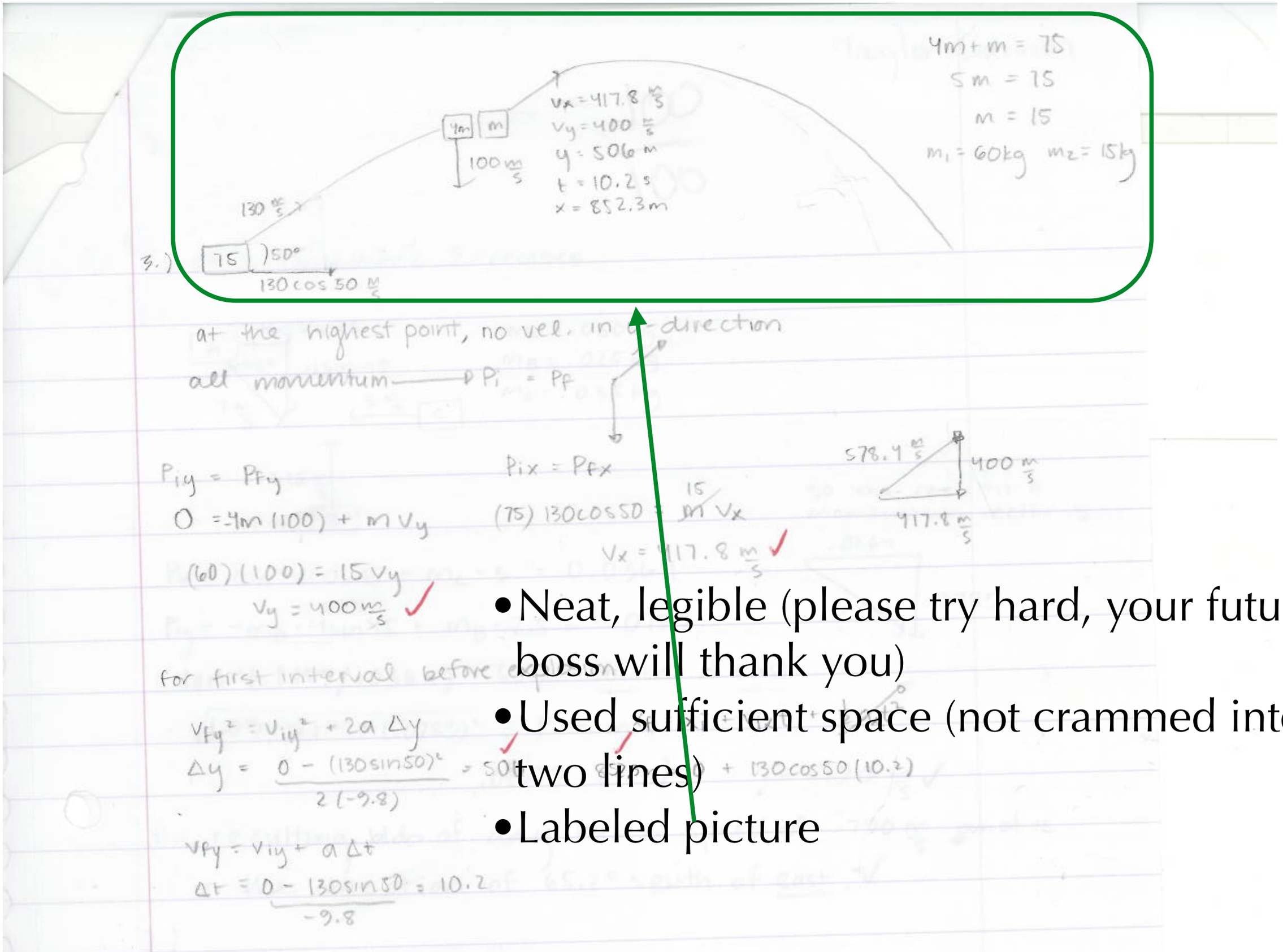


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- Labeled picture

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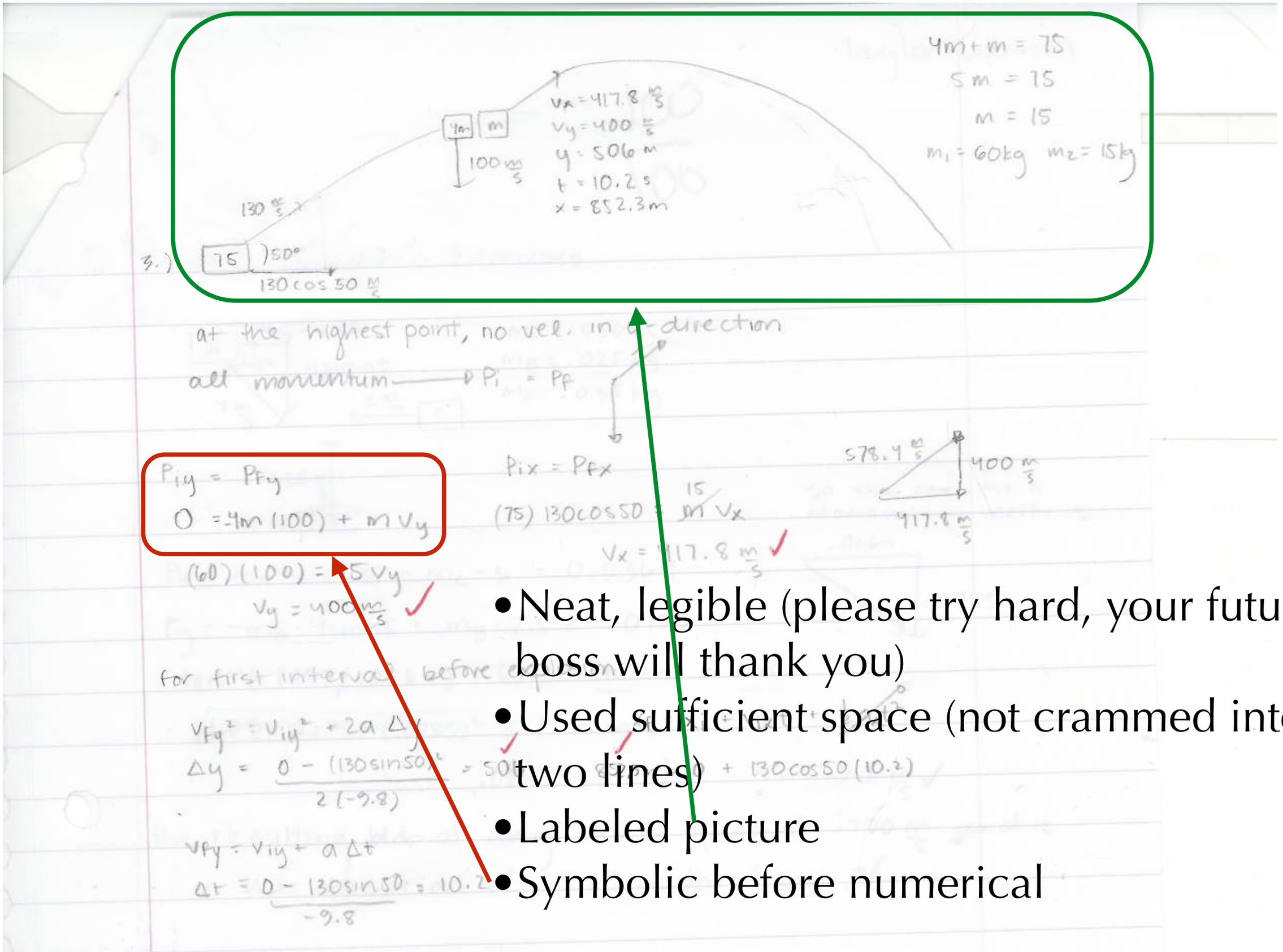



- Neat, legible (please try hard, your future boss will thank you)
- Used sufficient space (not crammed into two lines)
- Labeled picture
- Symbolic before numerical

# Assessments

- No midterm exams
- Weekly quizzes opening on Tuesday, closing on Friday.
- You are allowed two attempts.
- Quizzes cover previous three weeks of material.
- Approx. 2-3 conceptual questions and 3-4 mathematical.
- Partial Credit
- Don't cheat!!!

möbius
ASSESSMENT

Preview

A ball is thrown toward a cliff of height $h$ with a speed of 27 m/s and an initial launch angle of $45^{\circ}$ above the horizontal. It lands on the edge of the cliff 3.4 s later.

What is the height of the cliff, $h$?

Number | Units

What is the maximum height of the ball?

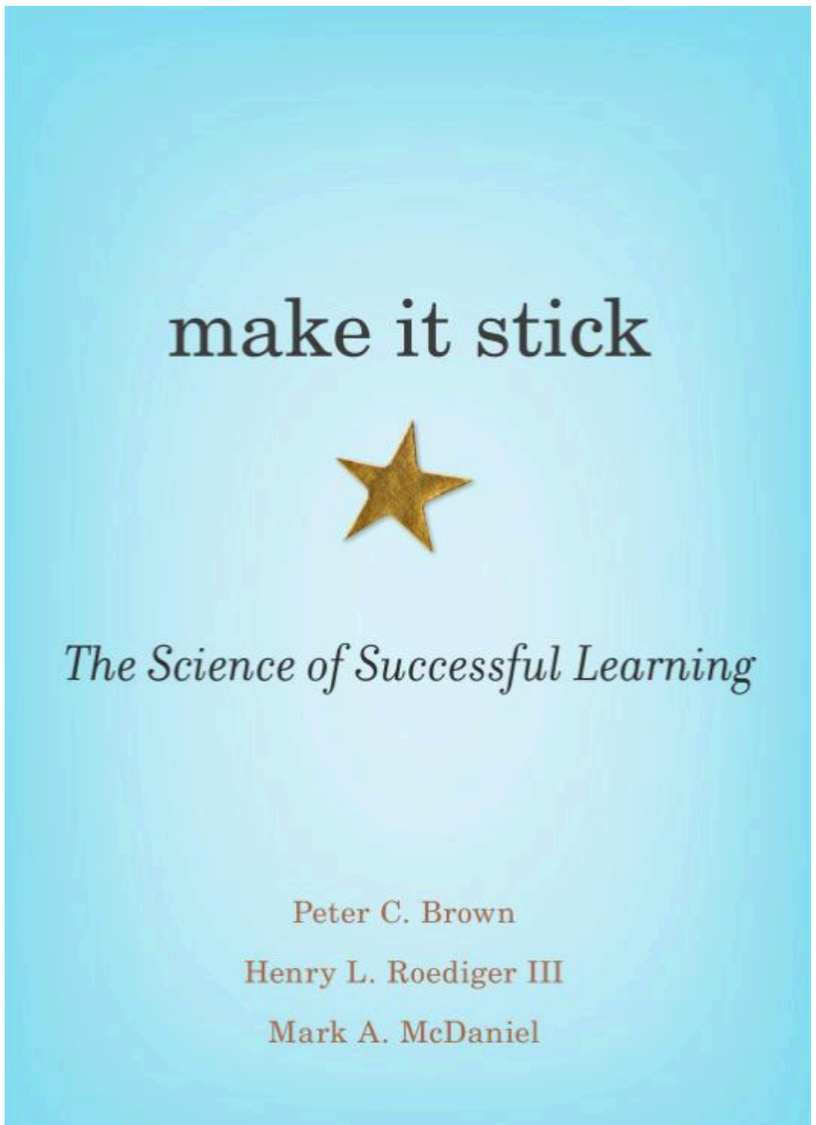
Number | Units

Want to beef up your quiz score? Do more HW problems!

5 HW points = 10% increase on quiz (I may modify this amount)

# Extra Credit

- Read “Make it Stick”: bump your grade at end of semester. (2%)
- Use Python for HW problems: drop an extra quiz score.
- Prepare a poster presentation on a device built on the principles of this class.




ANACONDA.

WOLFRAM
COMPUTATION MEETS KNOWLEDGE

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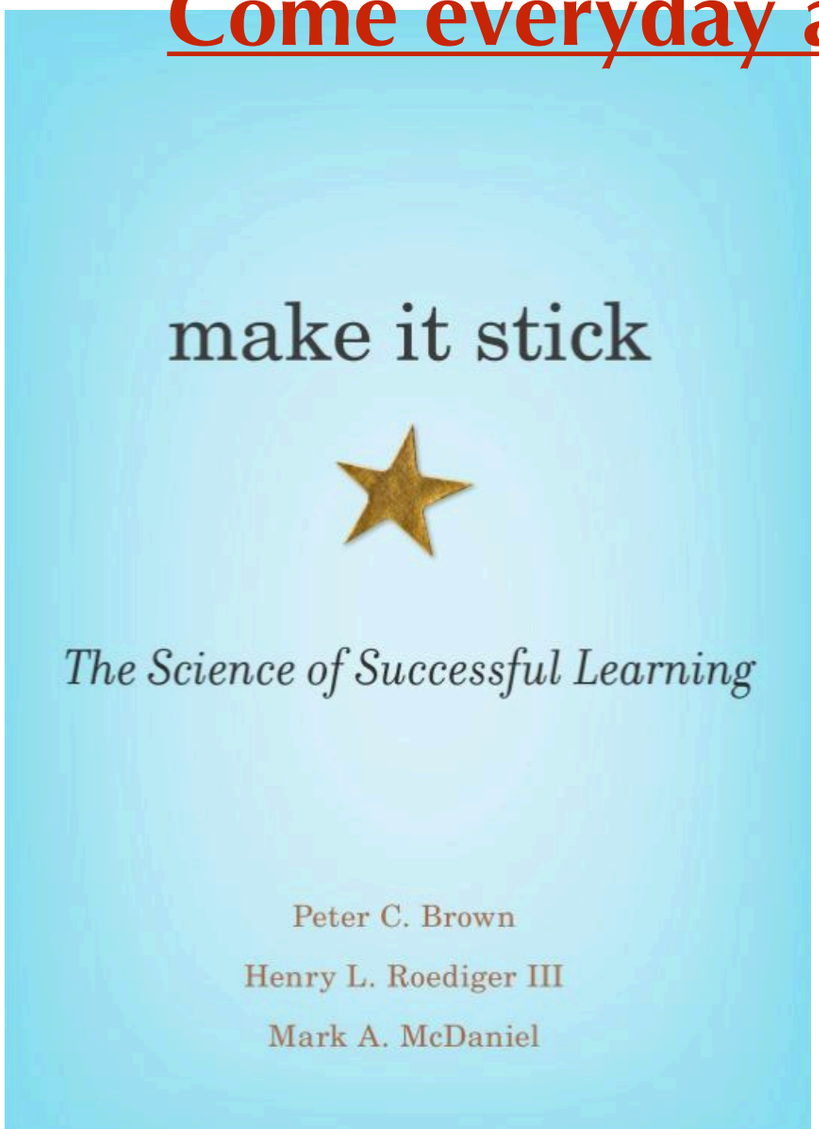
**Come everyday and you'll soon get the routine.**




ANACONDA.

WOLFRAM
COMPUTATION MEETS KNOWLEDGE

# Institutional Learning Outcomes

# Main topics for this course

1.Electricity and Magnetism - Forces, Fields, Voltage, Current, Resistors, Capacitors, Inductors, Transformers, Circuits, and more.
2.Problem-solving skills (math) in context of Electricity and Magnetism.
3.Numerical/graphical analysis (computers)

Physics majors

LSAT scores (law school)

MCAT scores (medical school)

GMAT (business school)

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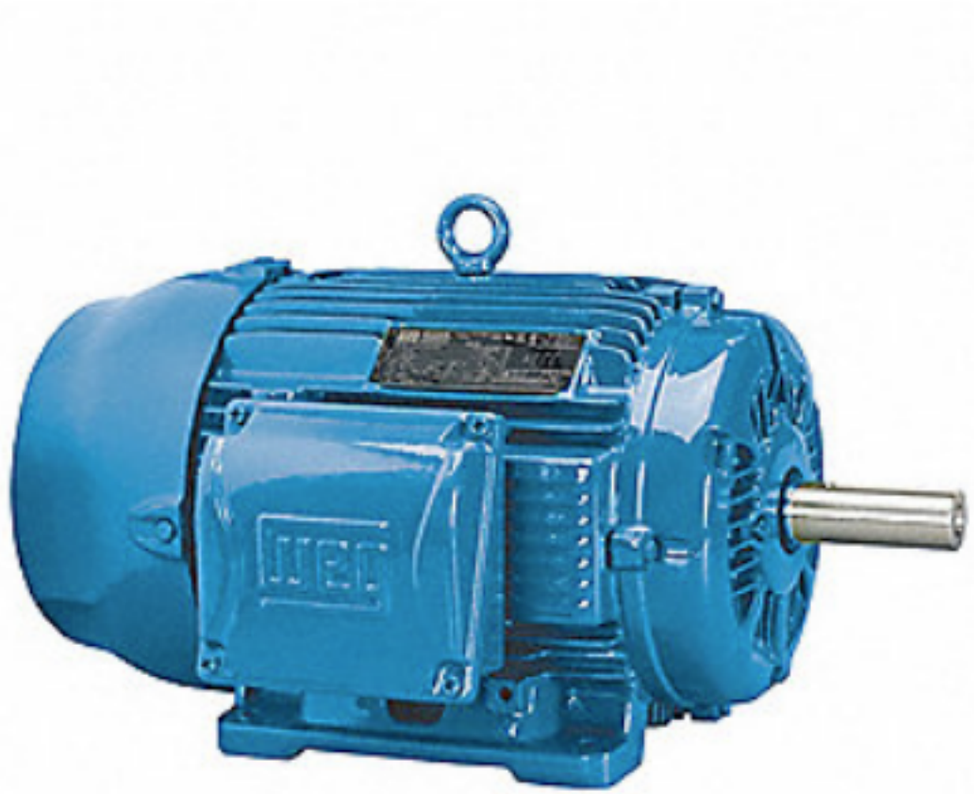


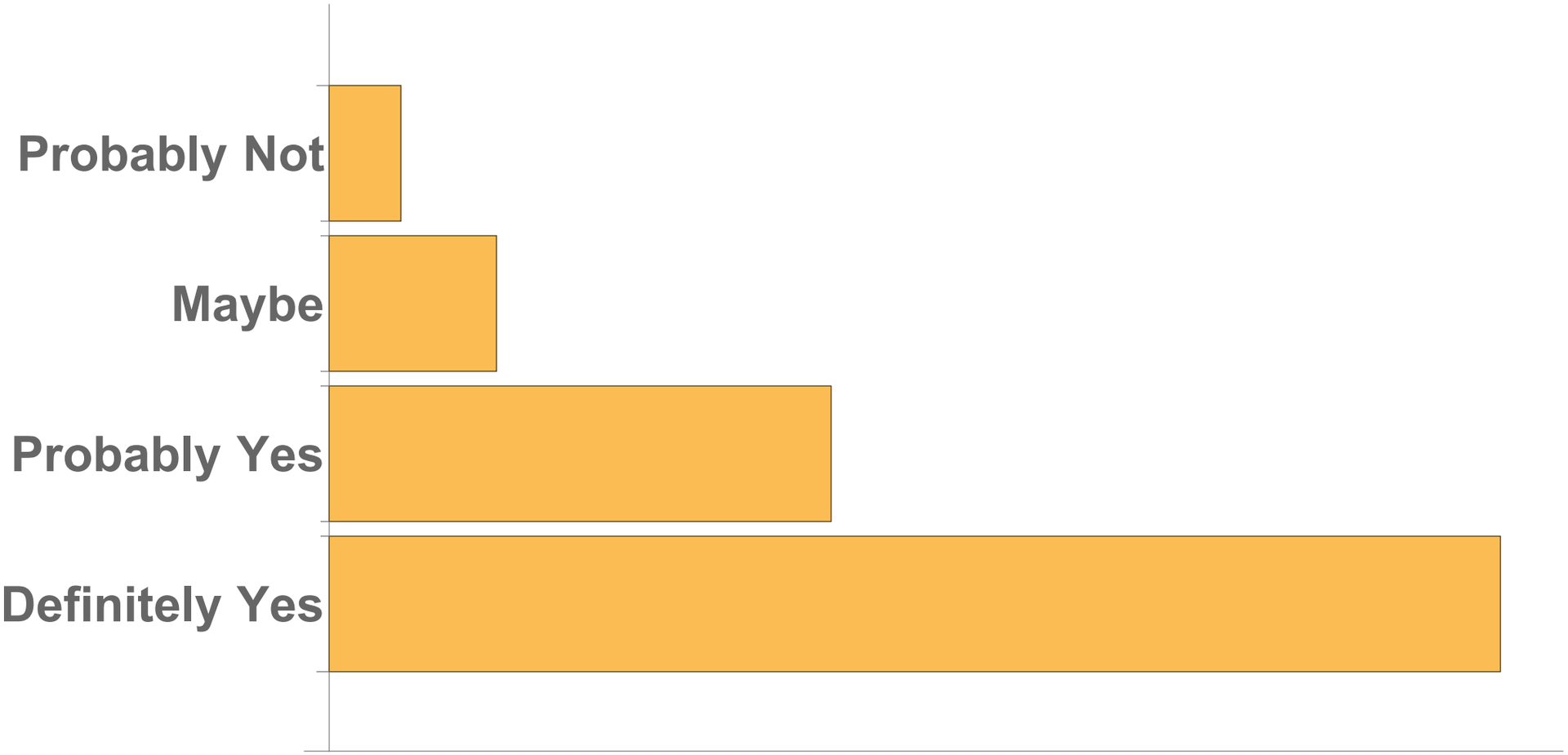
l)

# Things you should already be good at!

- Quadratic formula
- Cross product
- Dot product
- Algebra
- Trigonometry
- Pythagorean theorem
- Integration
- Derivatives
- Systems of Equations
- Degrees vs. Radians in your calculator.
- Vectors and components of vectors.
- Conservation of Energy (PH121!!!)

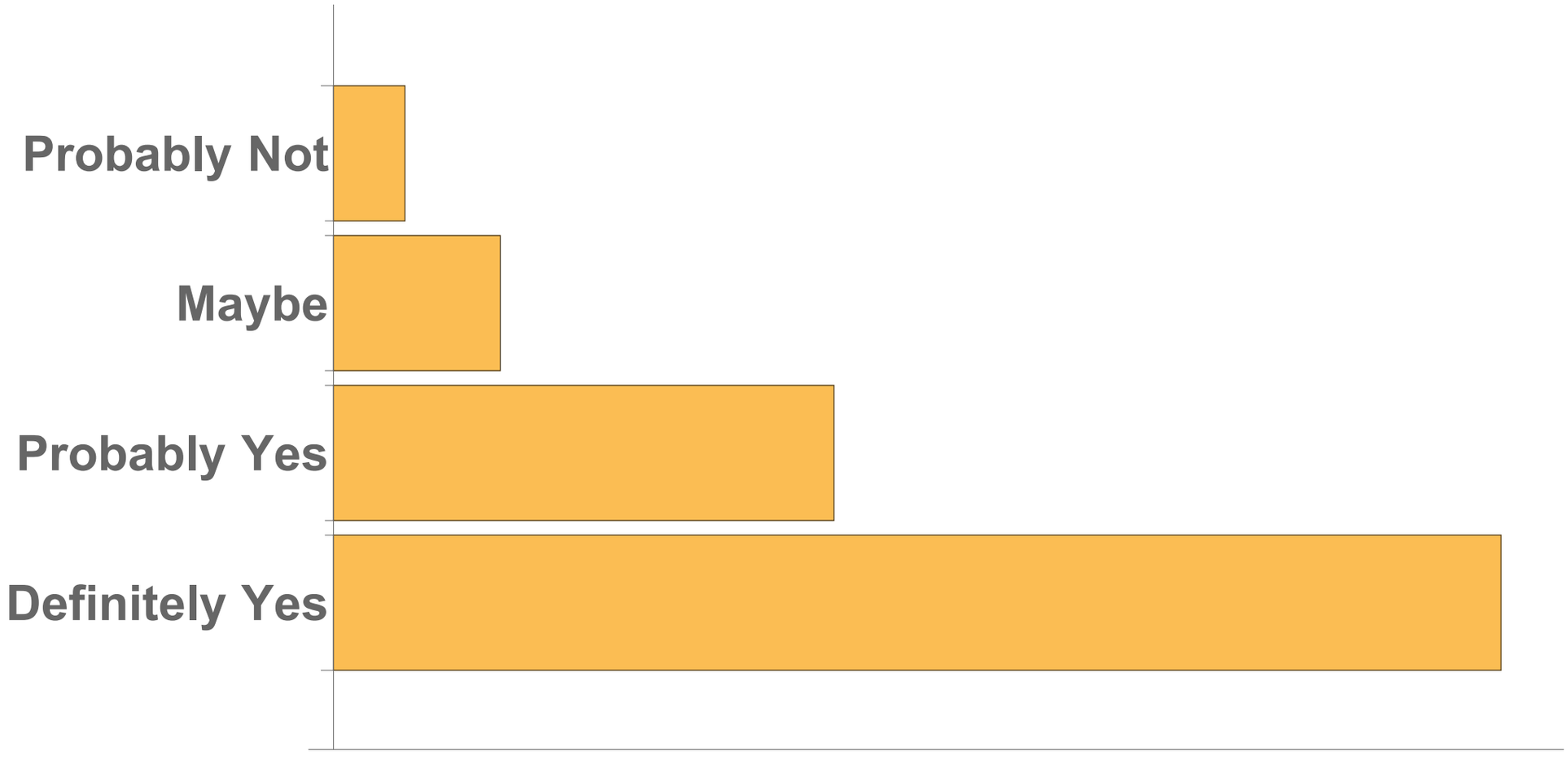
# What do past students say?

Do you like the format of the HW?



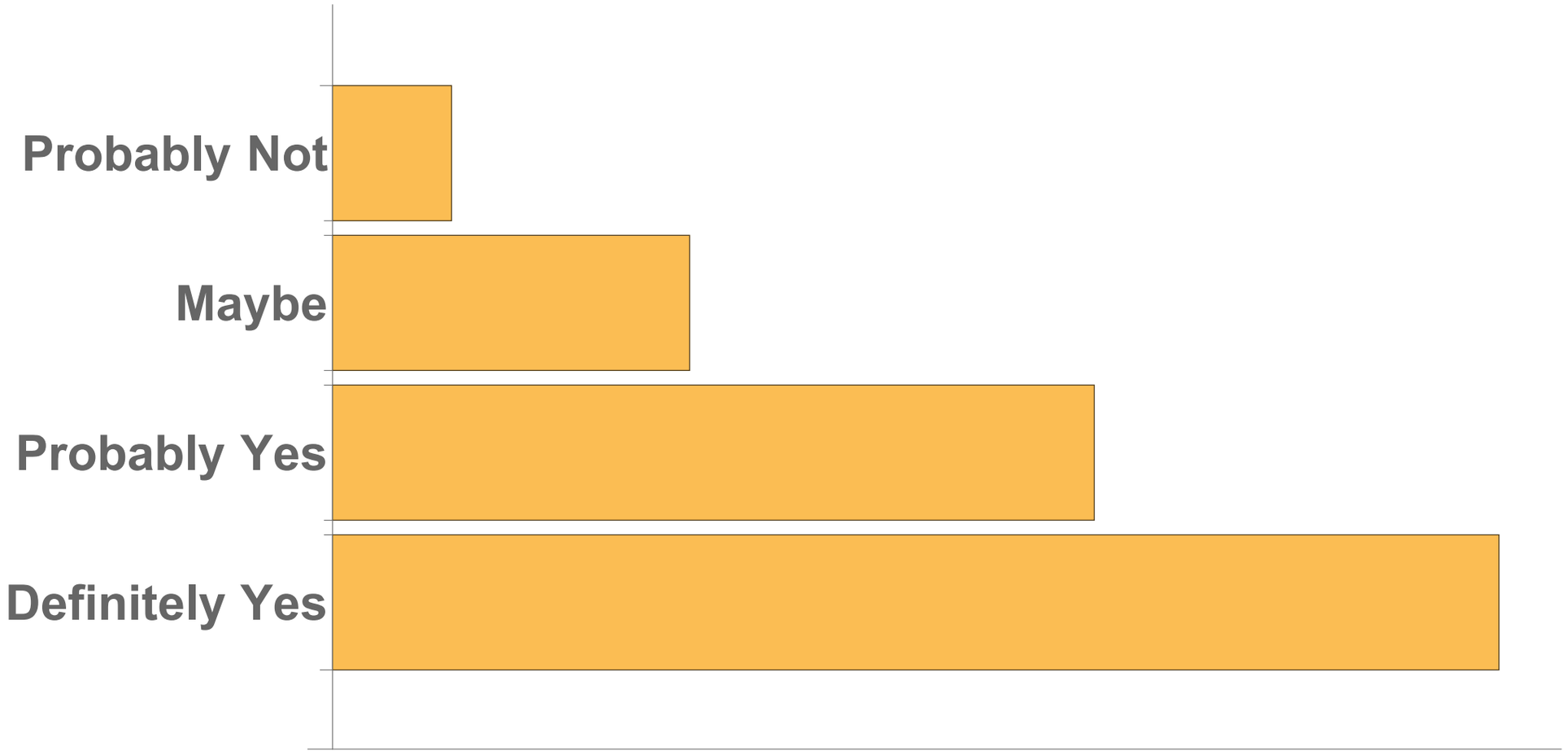
# What do past students say?

Did the quizzes help you forget less and master more?



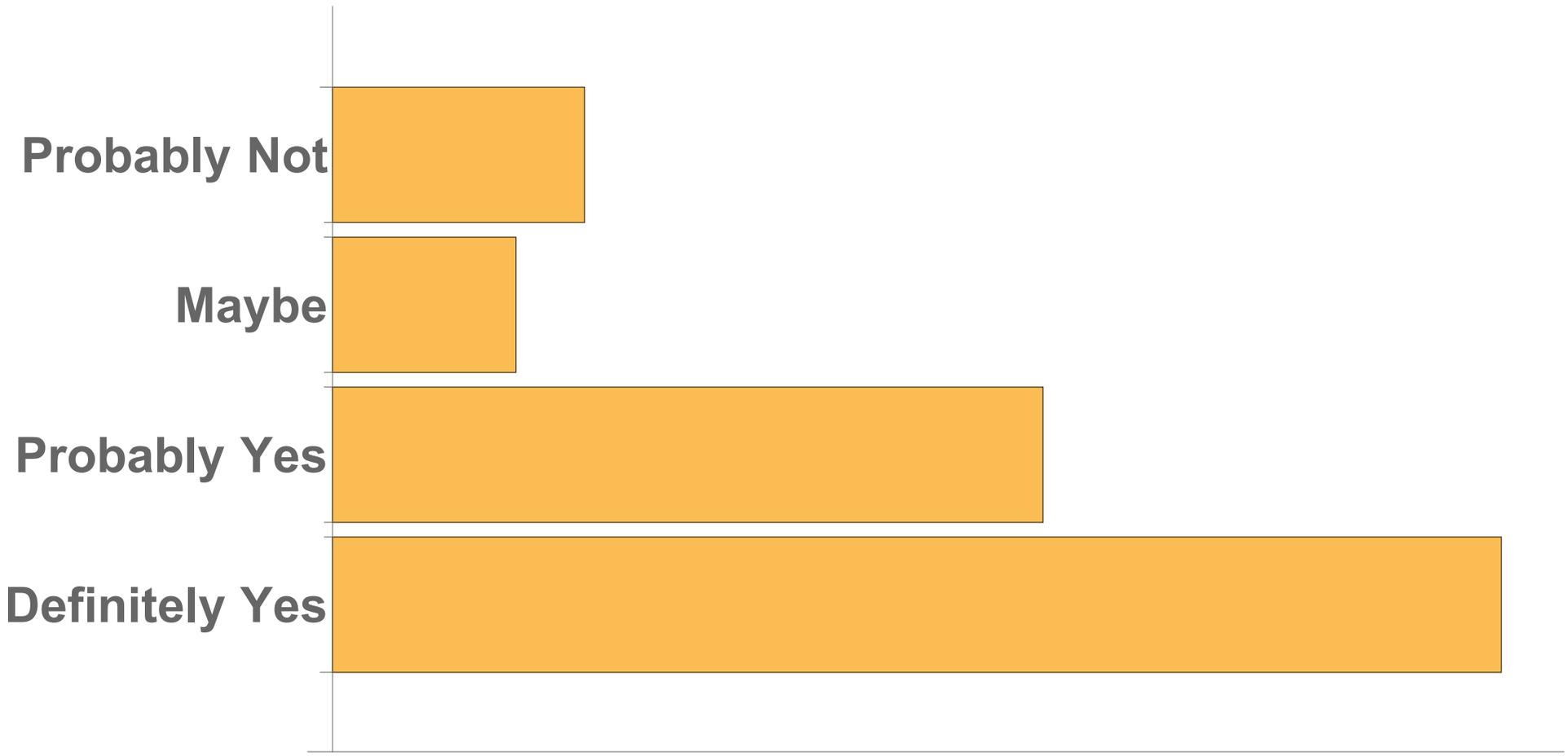
# What do past students say?

Are the quizzes an accurate measure of your abilities?



# What do past students say?

Is the load appropriate?



# Learning (teaching philosophy)

Think of something you do really well (or know a lot about).

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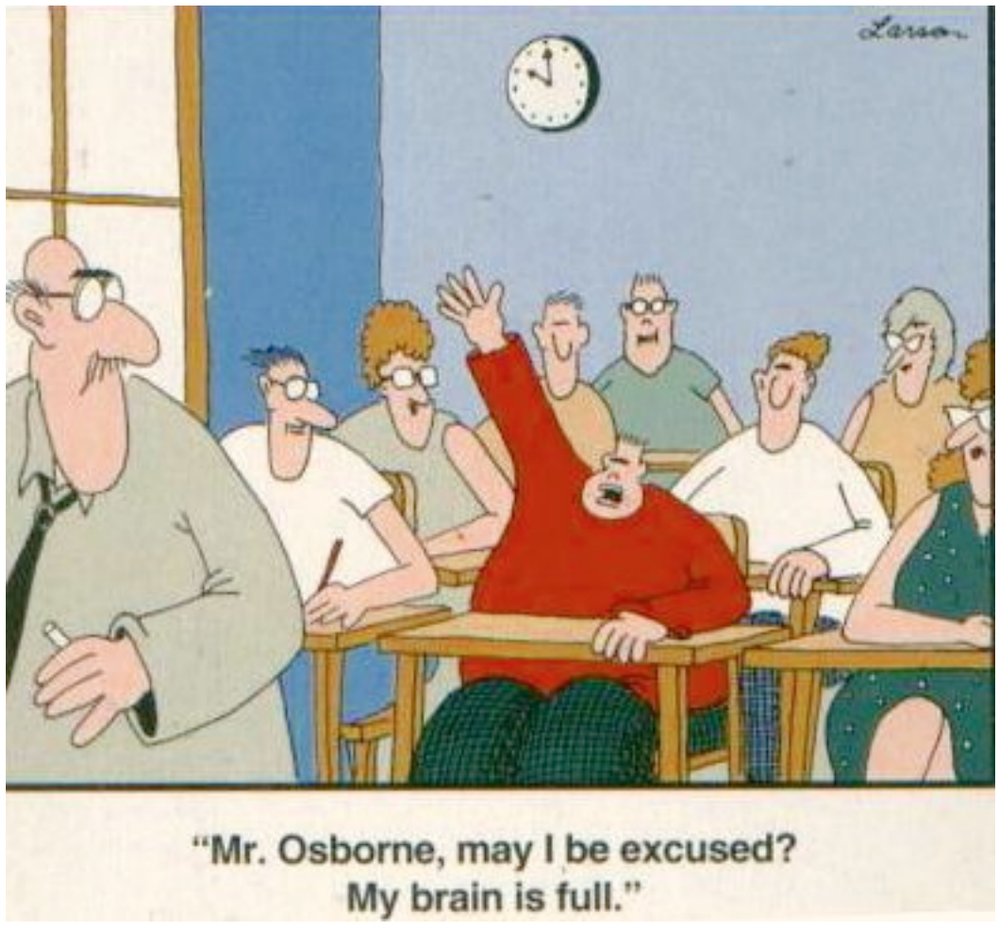

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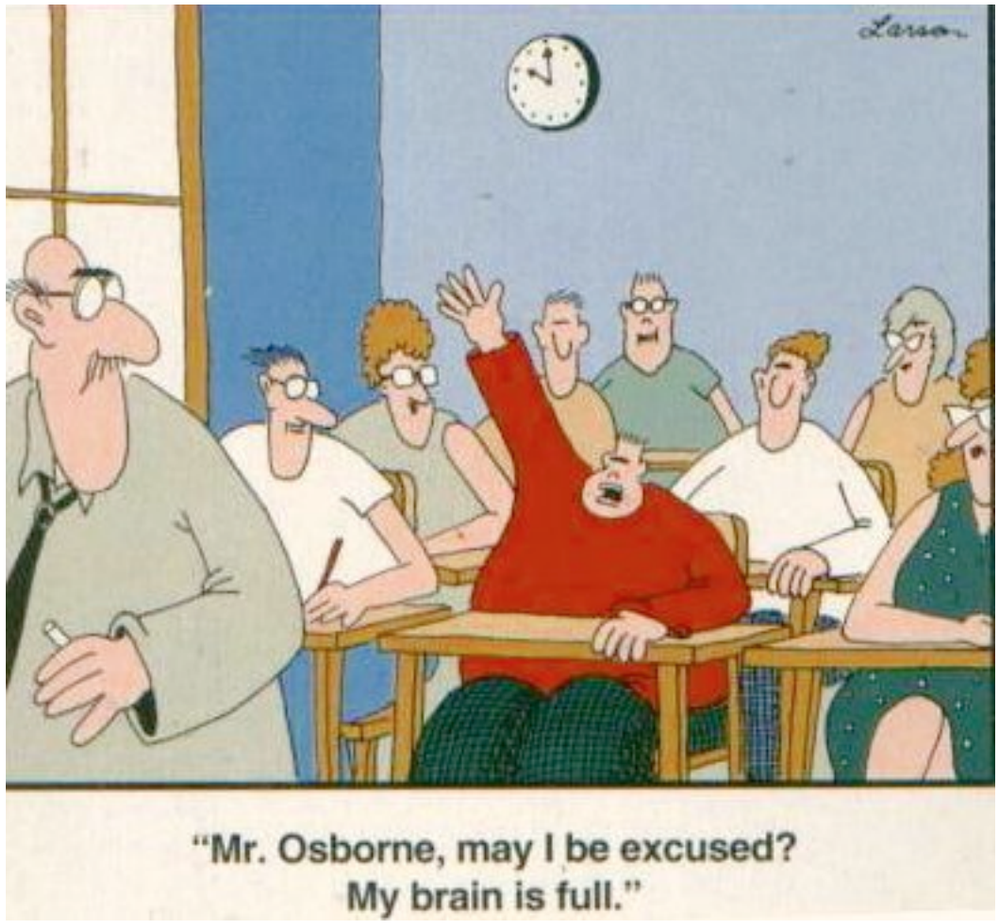
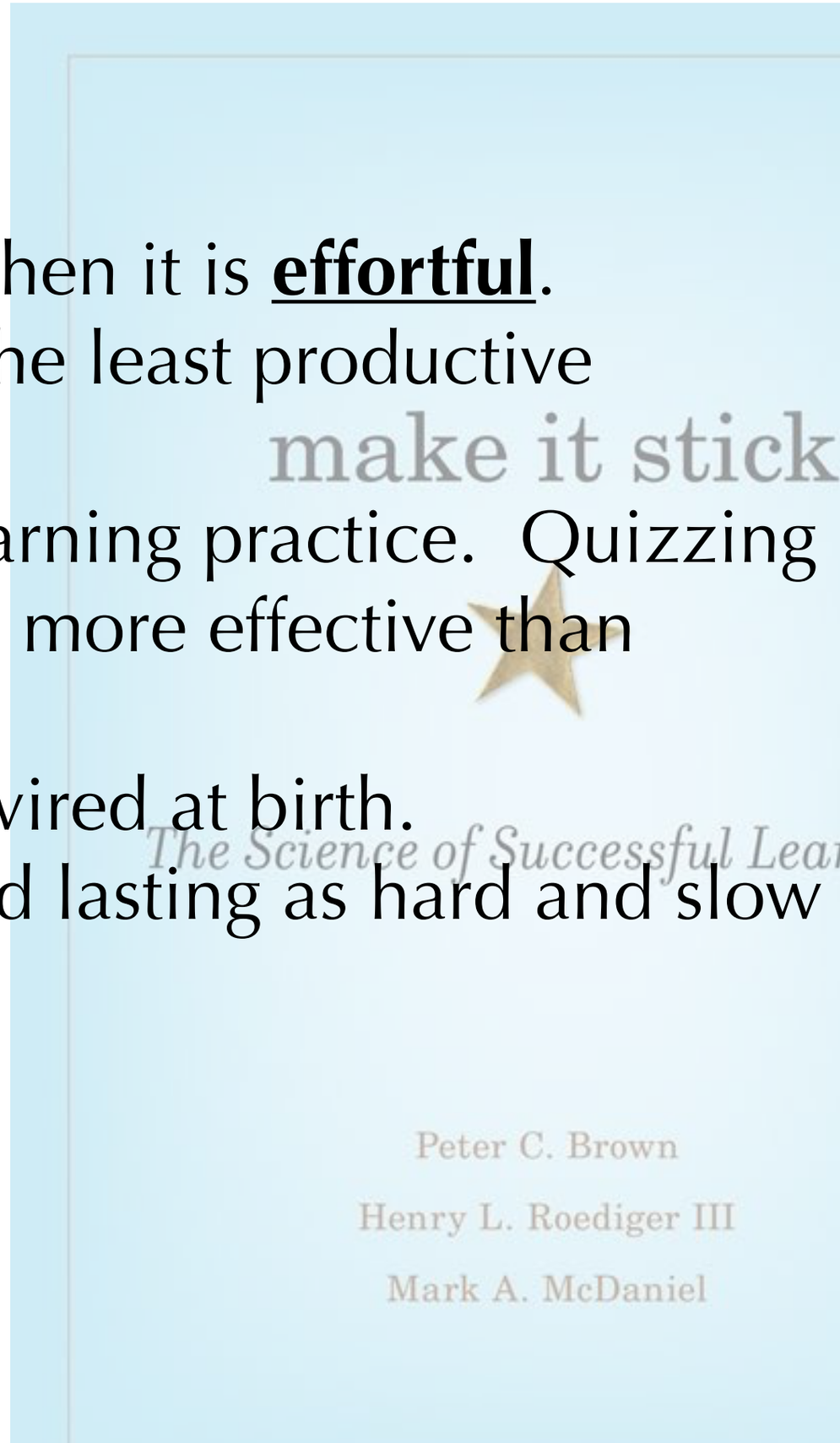



# Facts about learning

- Learning is deeper and more durable when it is **effortful**.
- Rereading text and massed practice is the least productive learning strategy (and most deceptive).
- Retrieval practice is a more effective learning practice. Quizzing yourself on key concepts after lecture is more effective than reviewing the lecture notes or text.
- Your intellectual abilities are not hard-wired at birth.
- Easy and fast learning is not as deep and lasting as hard and slow learning(sorry).



# Spiritual Thought

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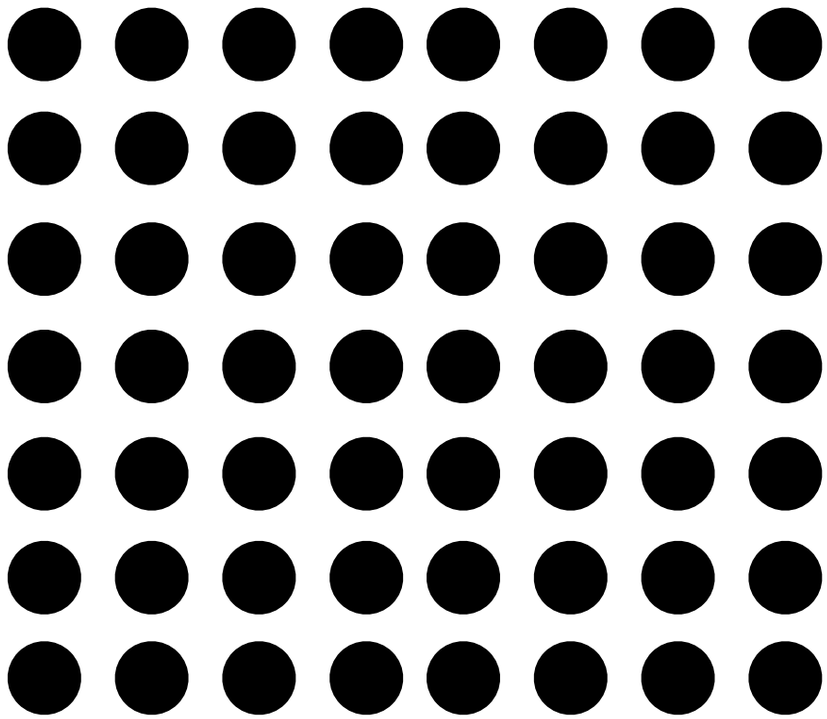
# Why did the Savior teach using parables?

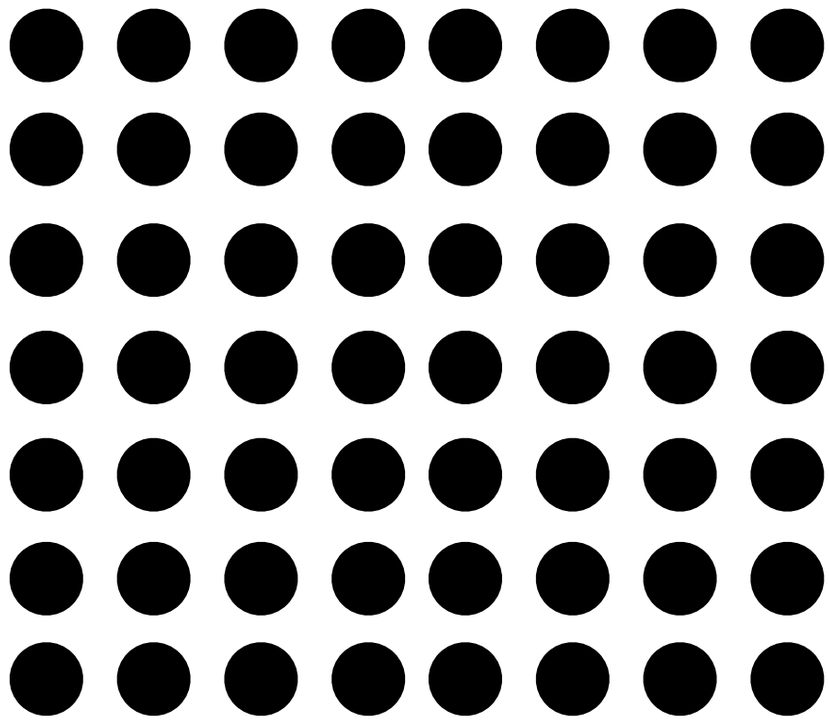
# Why did the Savior teach using parables?

Matt 13:10-11

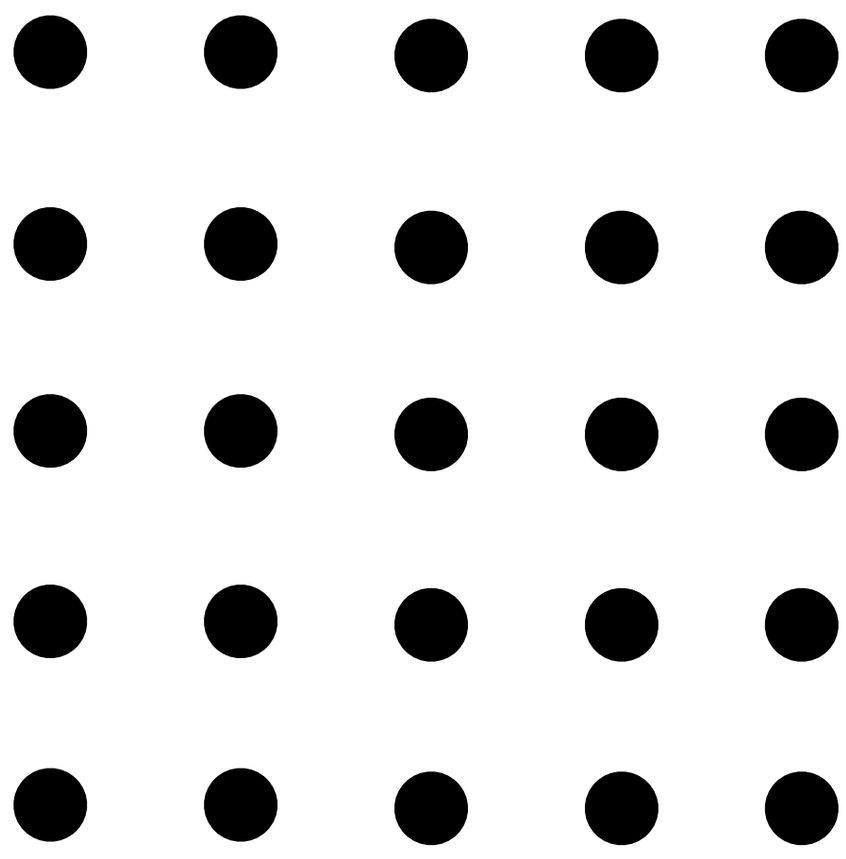
Alma 12:9-10



Cold



Hot



Will the hole get a) bigger or
b) smaller?