

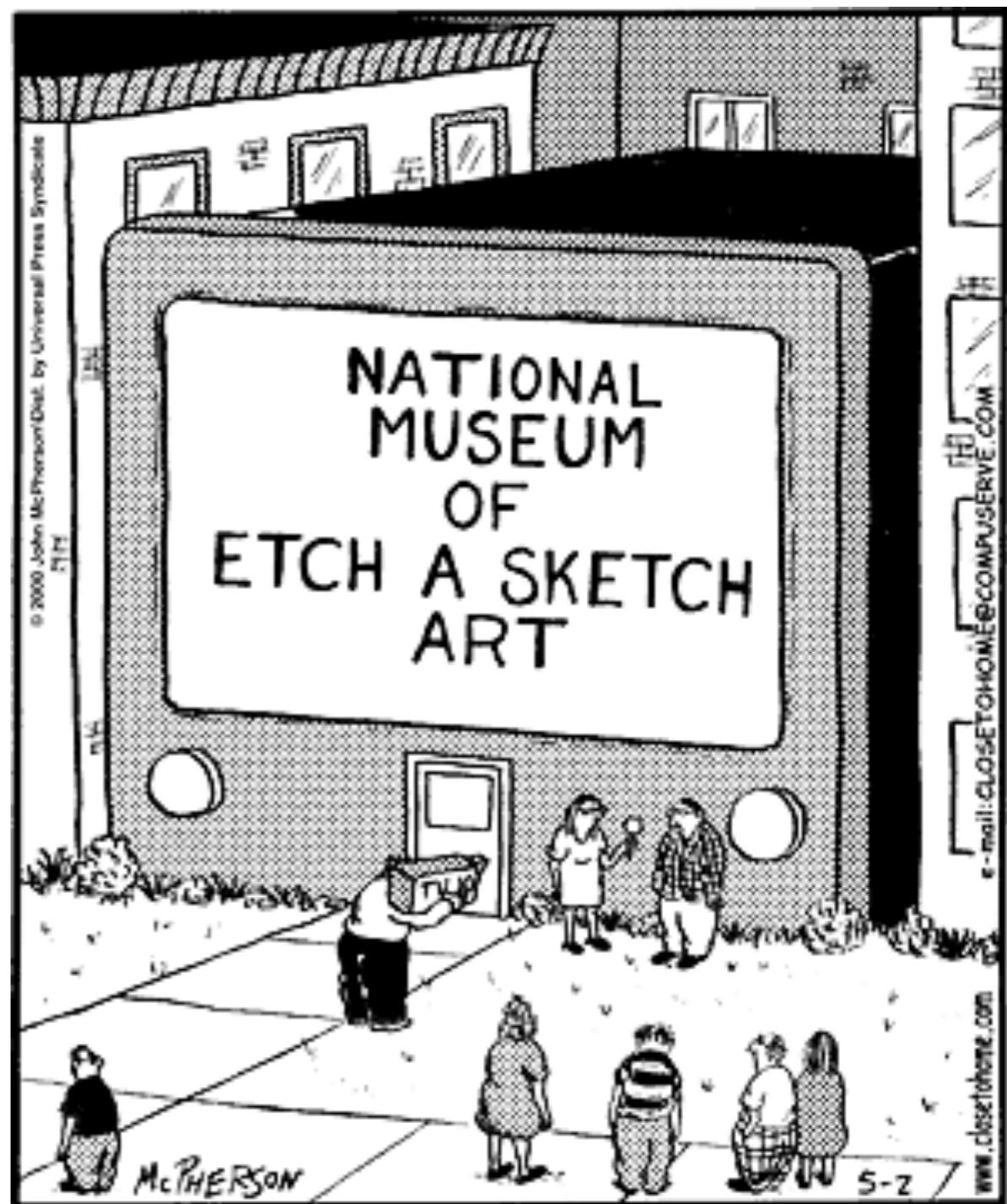
Physics 121

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?

The “what to do” of this course...

Syllabus

<https://lancejnelson.github.io/PH121>

- Schedule

- focus on concepts one day, problem solving (math) the next

- Warm-ups

- Participation (Tickets on work days)

- HW

- Grade your own. You pick the problems.

- Extra Credit??? — Python Python

Want a job? Learn this.

- Quizzes

What will be on the quizzes?

2 math questions (current week)

2 conc questions (current week)

1 math question (previous week)

1 conc question (previous week)

1 math/conc question (2 weeks previous)

- Honor Code
- Getting help

Quiz questions



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° 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
--------	-------

HW questions

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.



$h =$

Submit

[Request Answer](#)

Part B

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

Express your answer with the appropriate units.



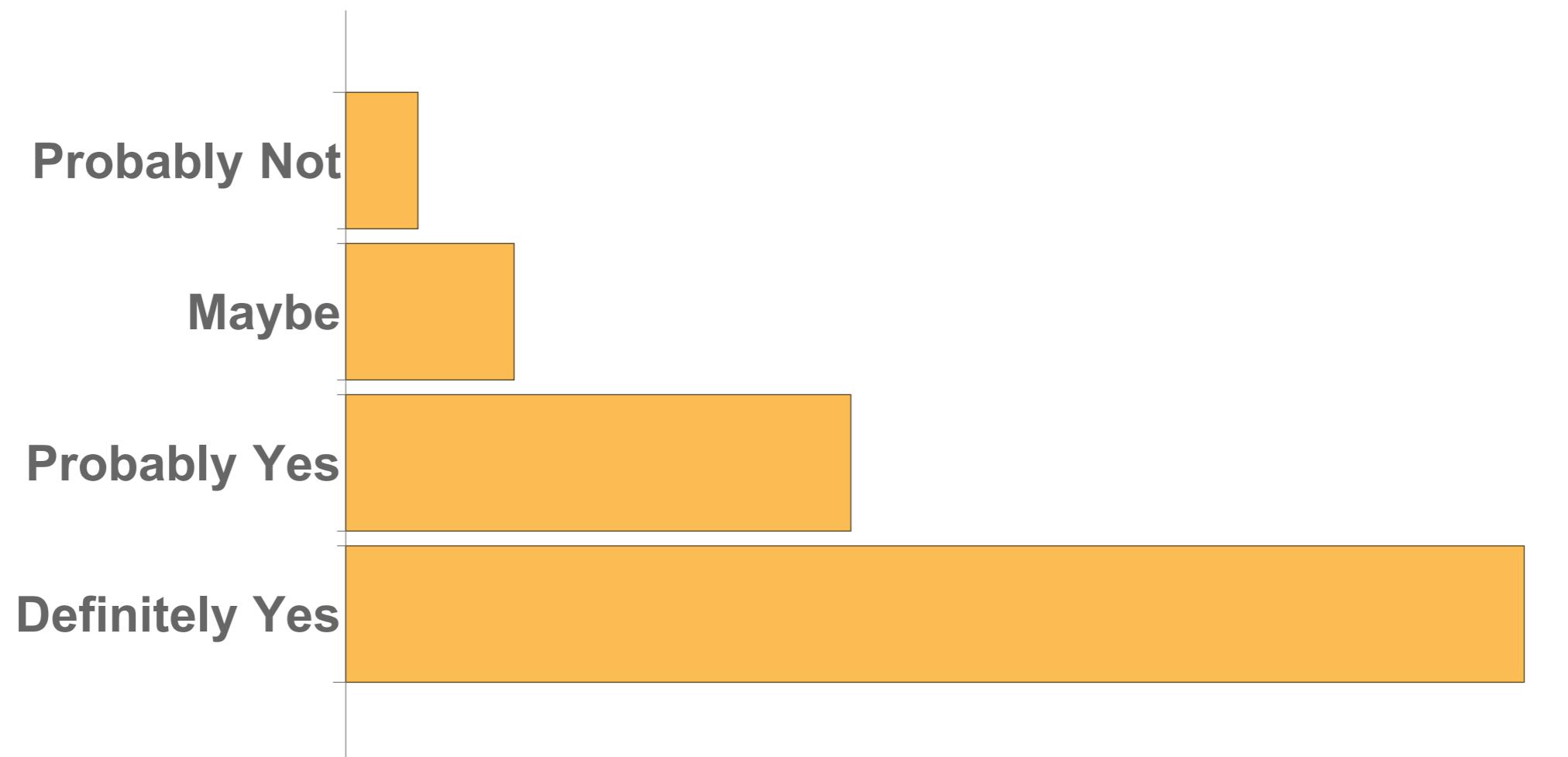
$t =$

Submit

[Request Answer](#)

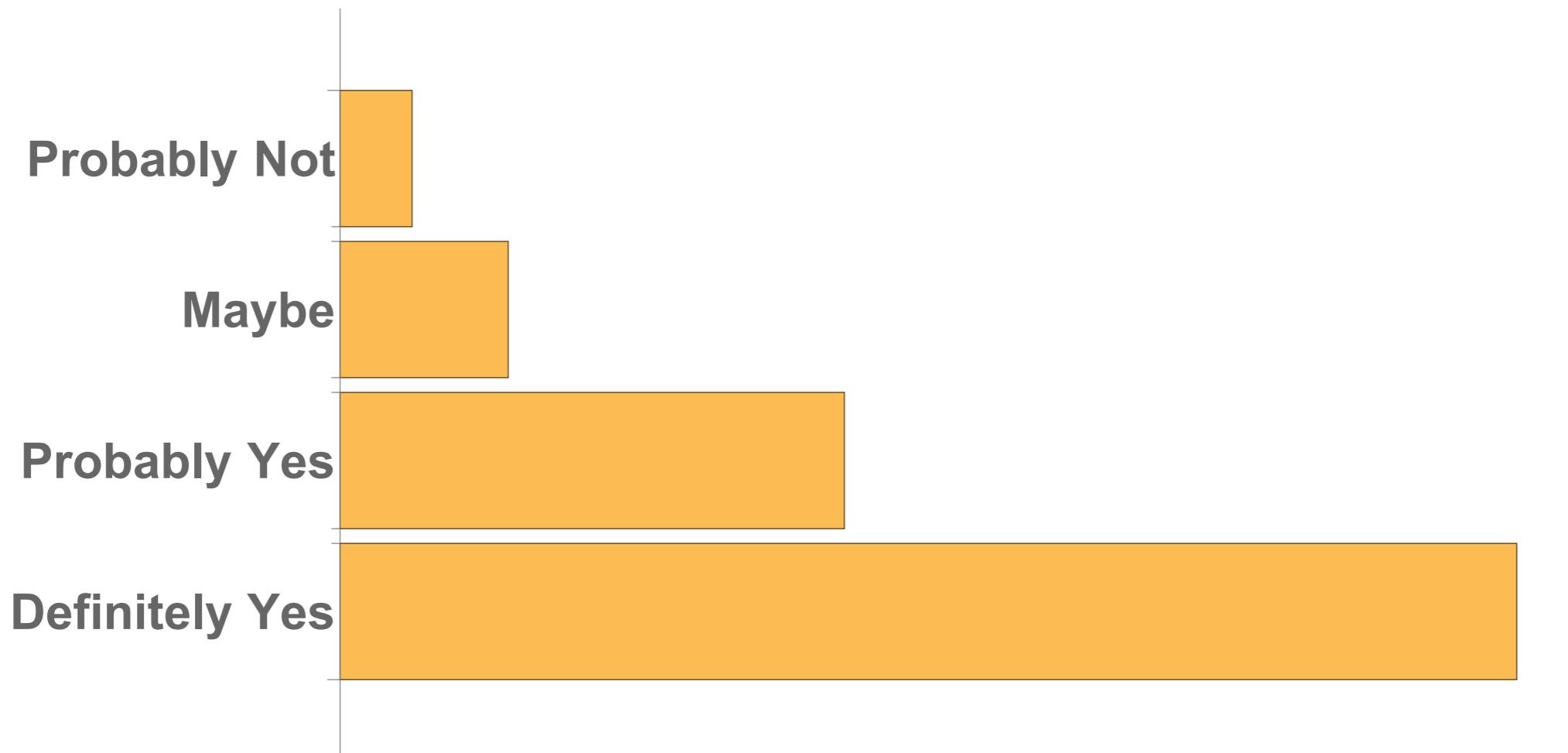
What do past students say?

Do you like the format of the HW?



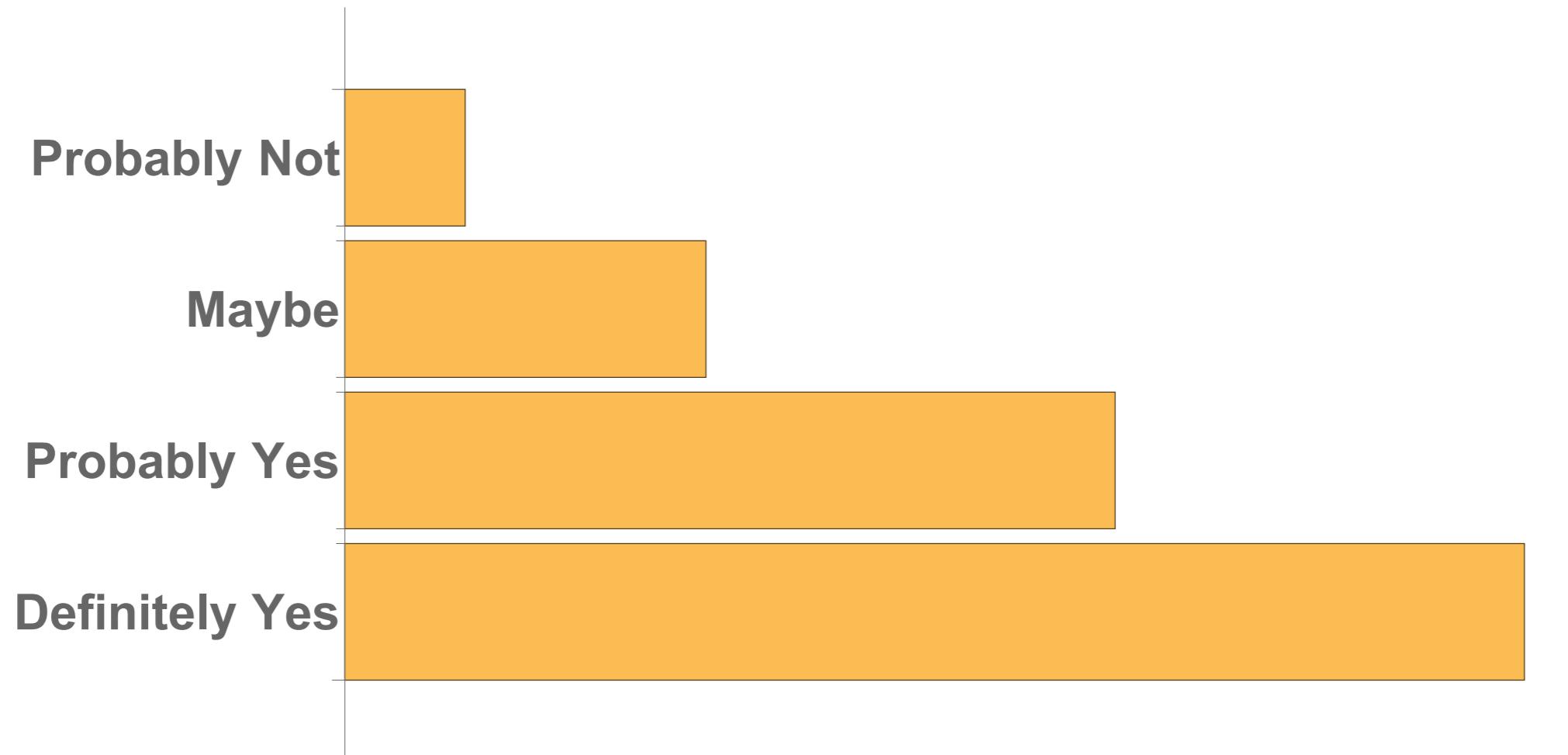
What do past students say?

Did the quizzes help you forget less and master more?



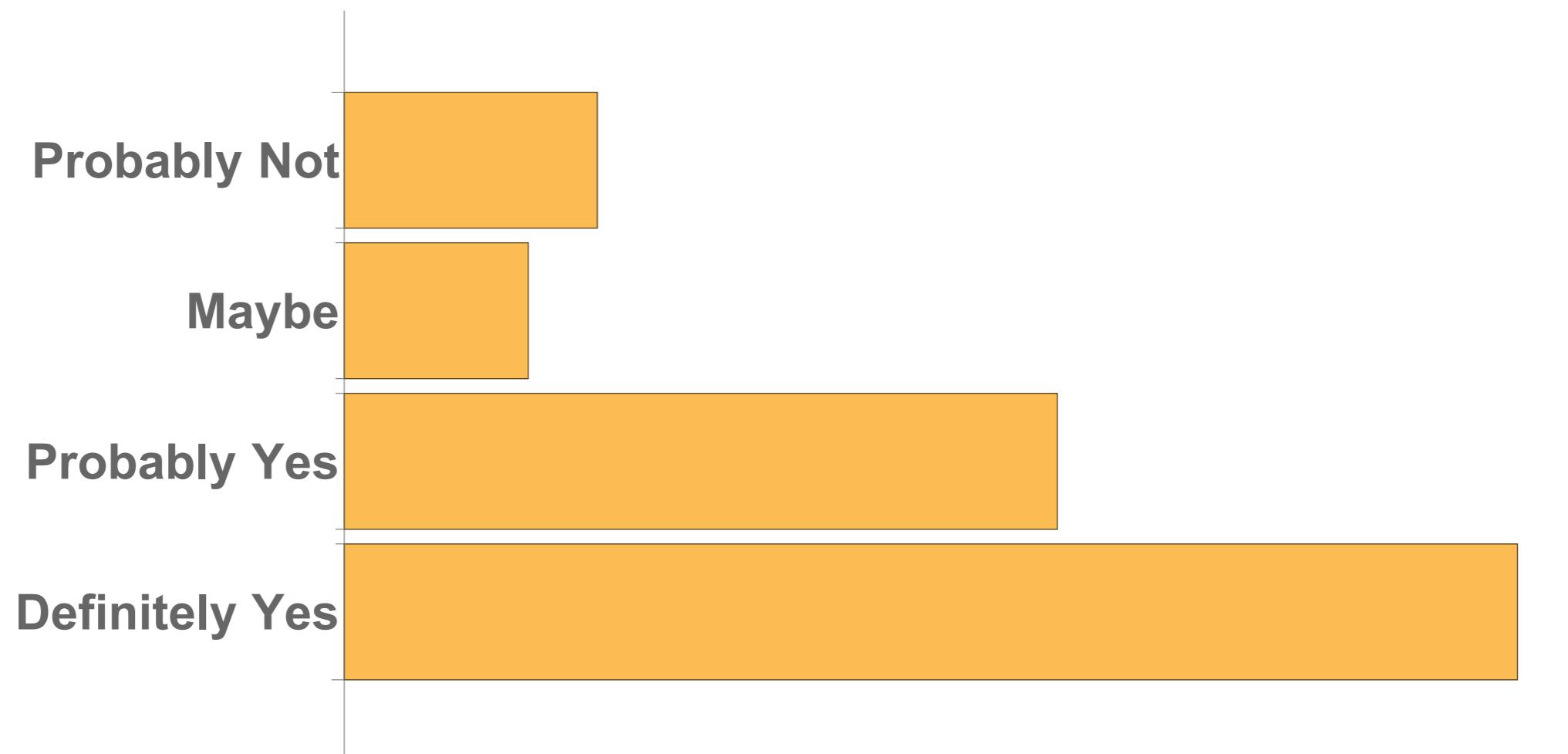
What do past students say?

Are the quizzes an accurate measure of your abilities?

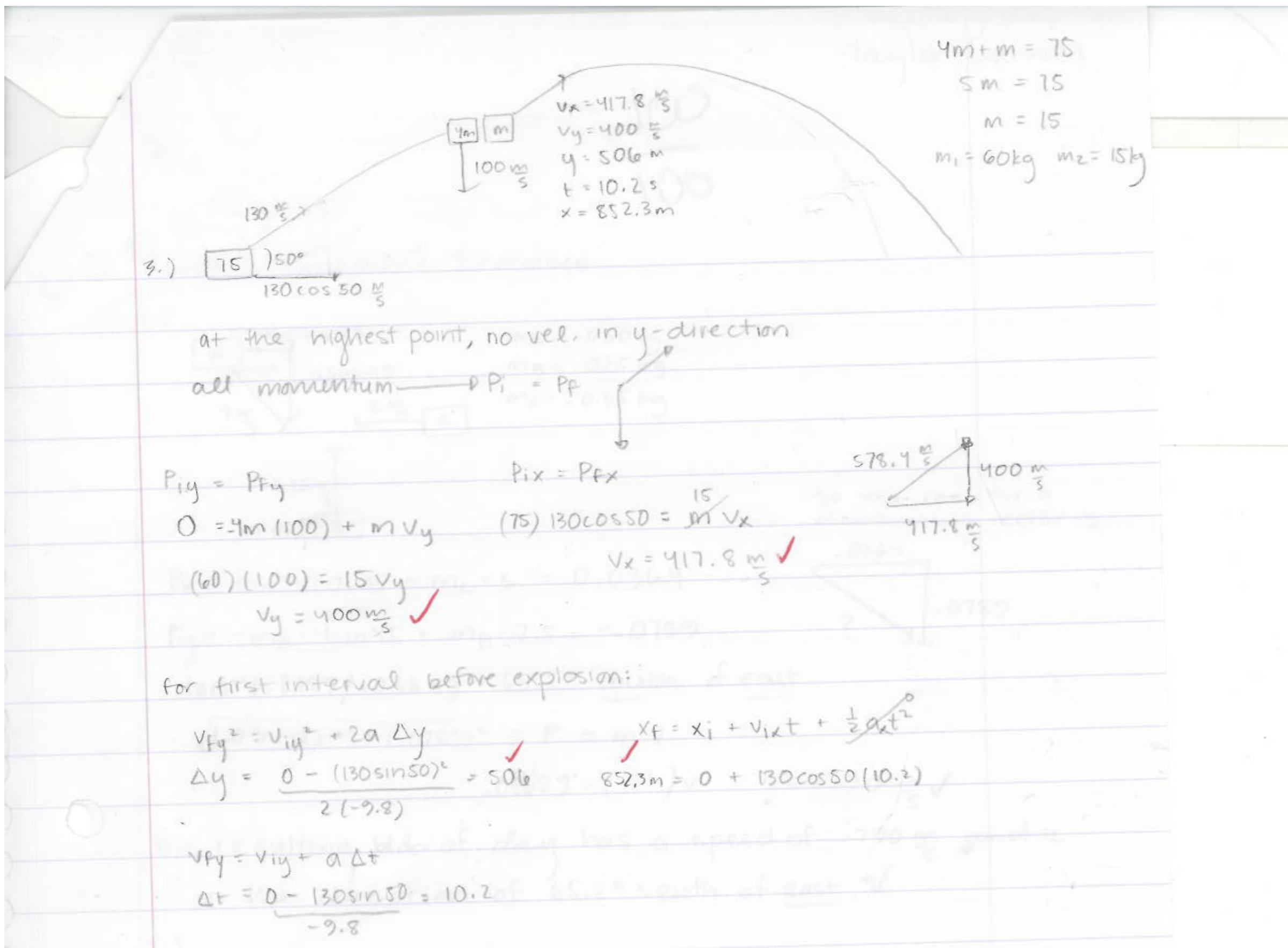


What do past students say?

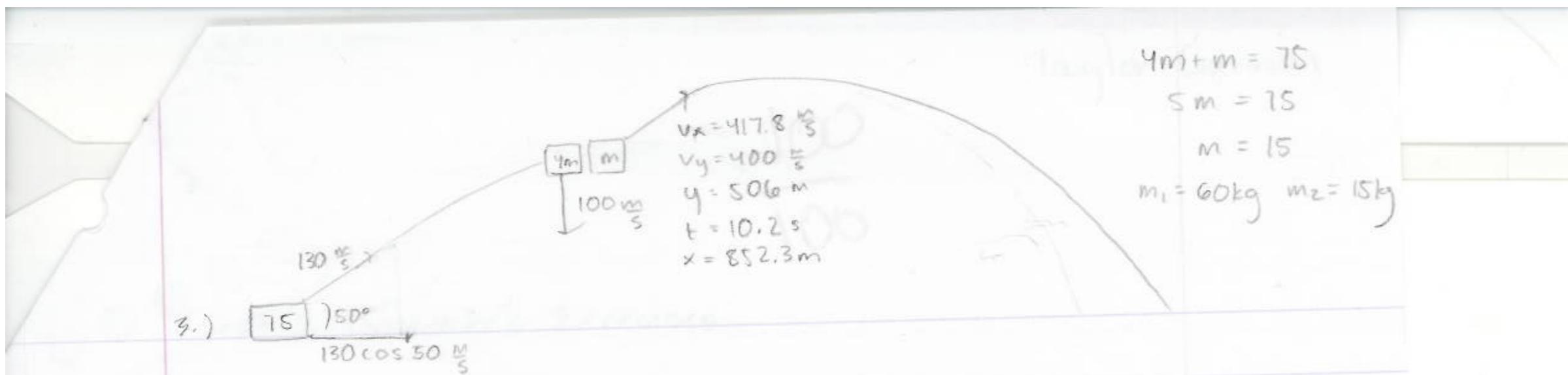
Is the load appropriate?



3D-BE-SNUB



3D-BE-SNUB



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

all momentum $\rightarrow P_i = P_f$

$$P_{iy} = P_{fy}$$

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

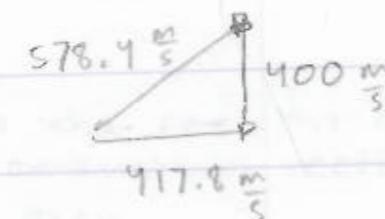
$$(60)(100) = 15 v_y$$

$$v_y = 400 \frac{m}{s}$$

$$P_{ix} = P_{fx}$$

$$(75) 130 \cos 50^\circ = m v_x$$

$$v_x = 417.8 \frac{m}{s}$$



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

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

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

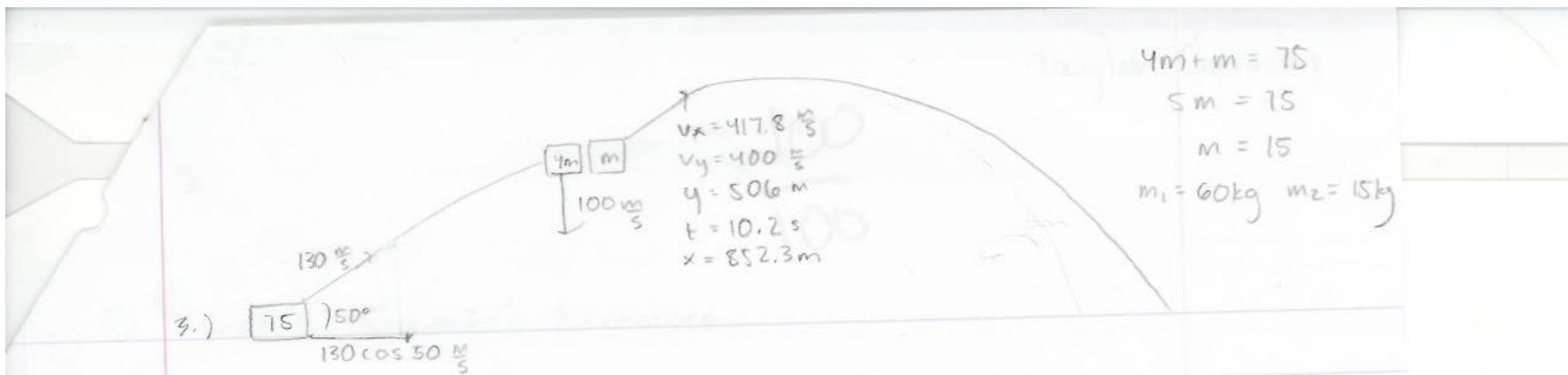
$$x_f = x_i + v_{ix}t + \frac{1}{2} a x t^2$$

$$852.3 \frac{m}{s} = 0 + 130 \cos 50^\circ (10.2)$$

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

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

3D-BE-SNUB



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

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

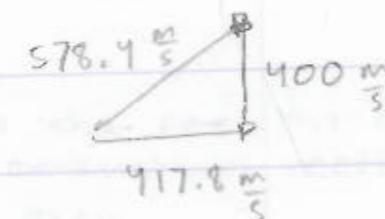
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- Used sufficient space (not crammed into two lines)

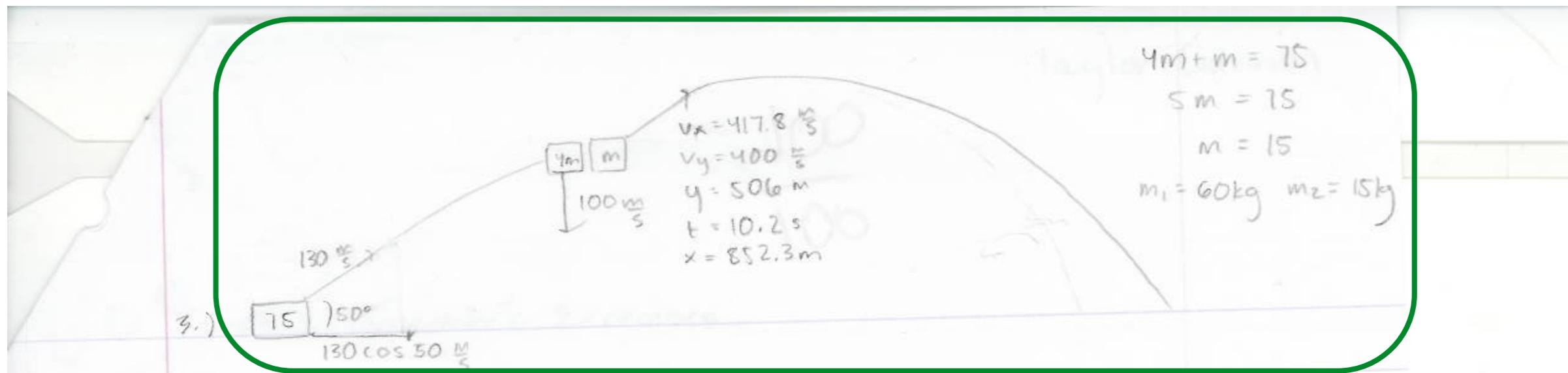
$$v_{fy}^2 = v_{iy}^2 + 2a \Delta y$$

$$\Delta y = \frac{0 - (130 \sin 50) \cdot t}{2(-9.8)} = 50 \frac{m}{s} + 130 \cos 50 (10.2)$$

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

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

3D-BE-SNUB



at the highest point, no vel. in \hat{z} -direction

all momentum $P_i = P_f$

$$P_{iy} = P_{fy}$$

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

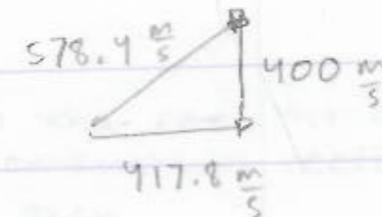
$$(60)(100) = 15 v_y$$

$$v_y = 400 \frac{m}{s} \checkmark$$

$$P_{ix} = P_{fx}$$

$$(75) 130 \cos 50^\circ = m v_x$$

$$v_x = 417.8 \frac{m}{s} \checkmark$$



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

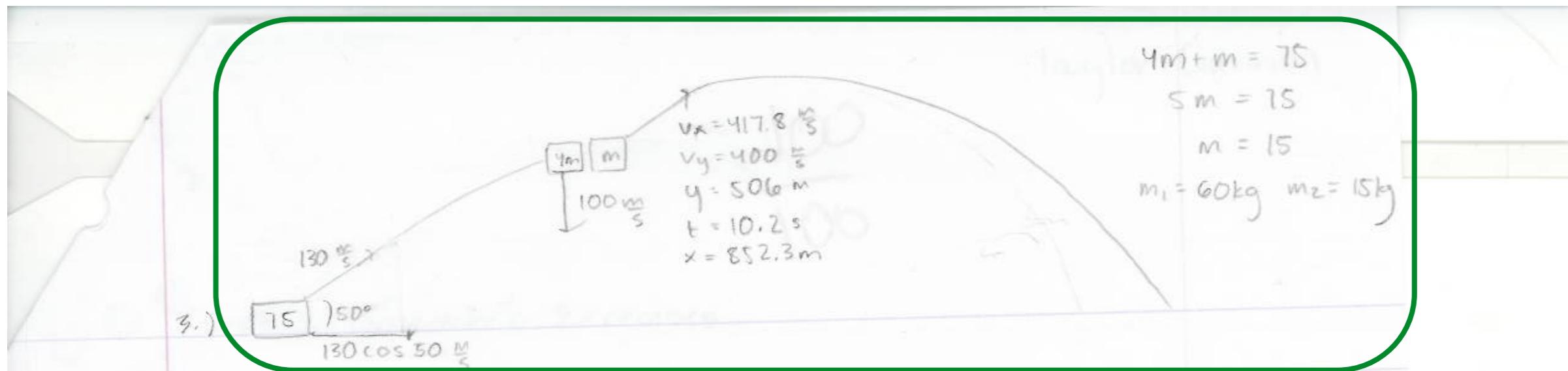
$$v_{fy}^2 = v_{iy}^2 + 2a \Delta y$$

$$\Delta y = \frac{0 - (130 \sin 50) \cdot t}{2(-9.8)} = 506 \text{ m}$$

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

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

3D-BE-SNUB



at the highest point, no vel. in \hat{y} -direction

all momentum $\rightarrow P_i = P_f$

$$P_{iy} = P_{Fy}$$

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

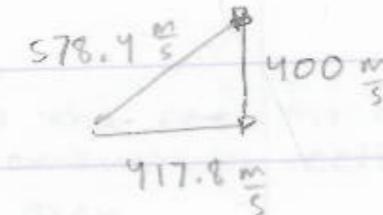
$$(60)(100) = 5v_y$$

$$v_y = 400 \frac{\text{m}}{\text{s}}$$

$$P_{ix} = P_{Fx}$$

$$(75) 130 \cos 50^\circ = 15 v_x$$

$$v_x = 417.8 \frac{\text{m}}{\text{s}}$$



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

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

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

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

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

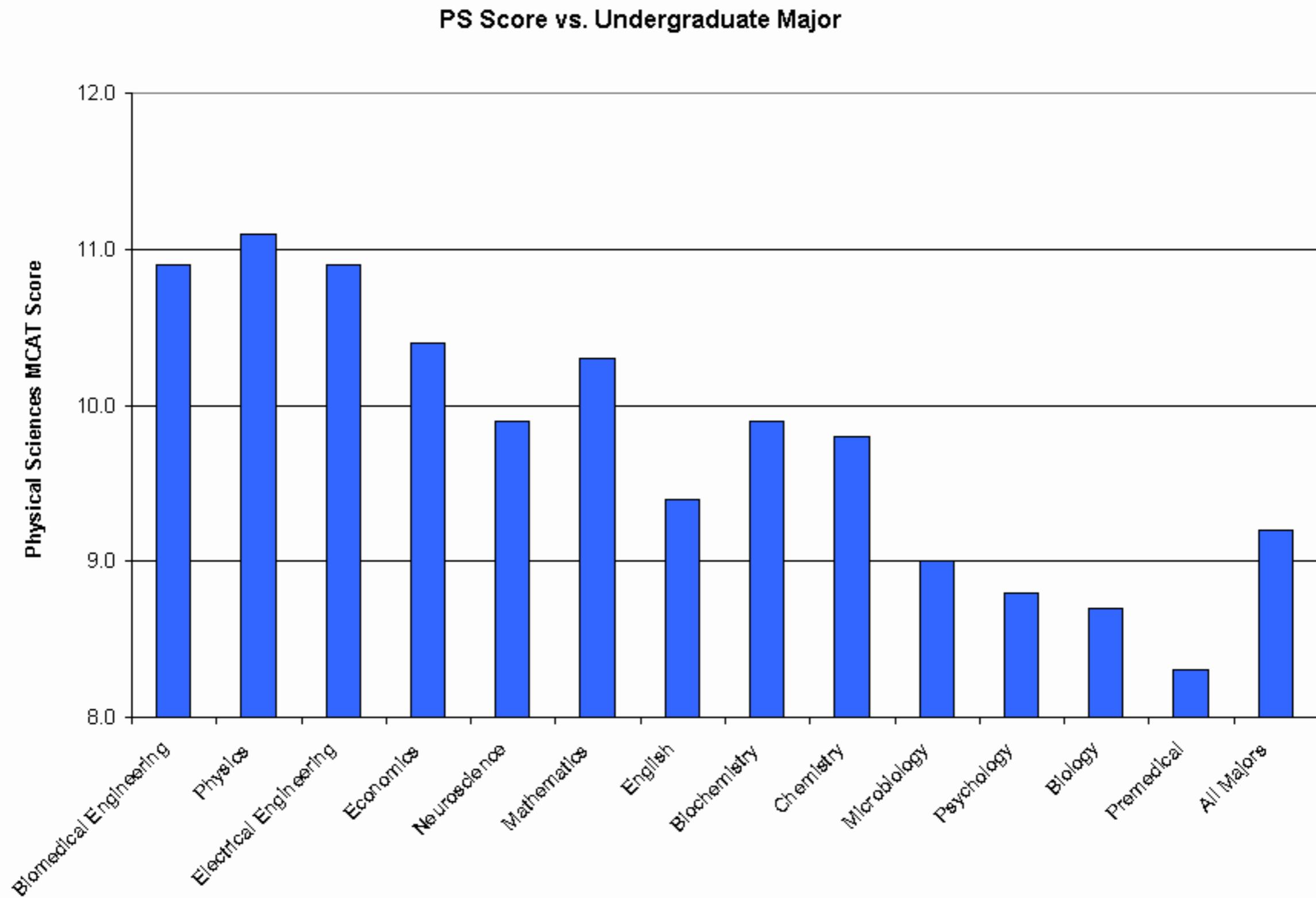
Main topics for this course

1. Conceptual understanding of Newtonian mechanics
2. Problem-solving skills (math) in context of Newtonian mechanics
3. Numerical/graphical analysis (computers)

Physics majors

Surprising statistic

Main topics for this course



Raytheon M982

Video

Learning (teaching philosophy)

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

Learning (teaching philosophy)

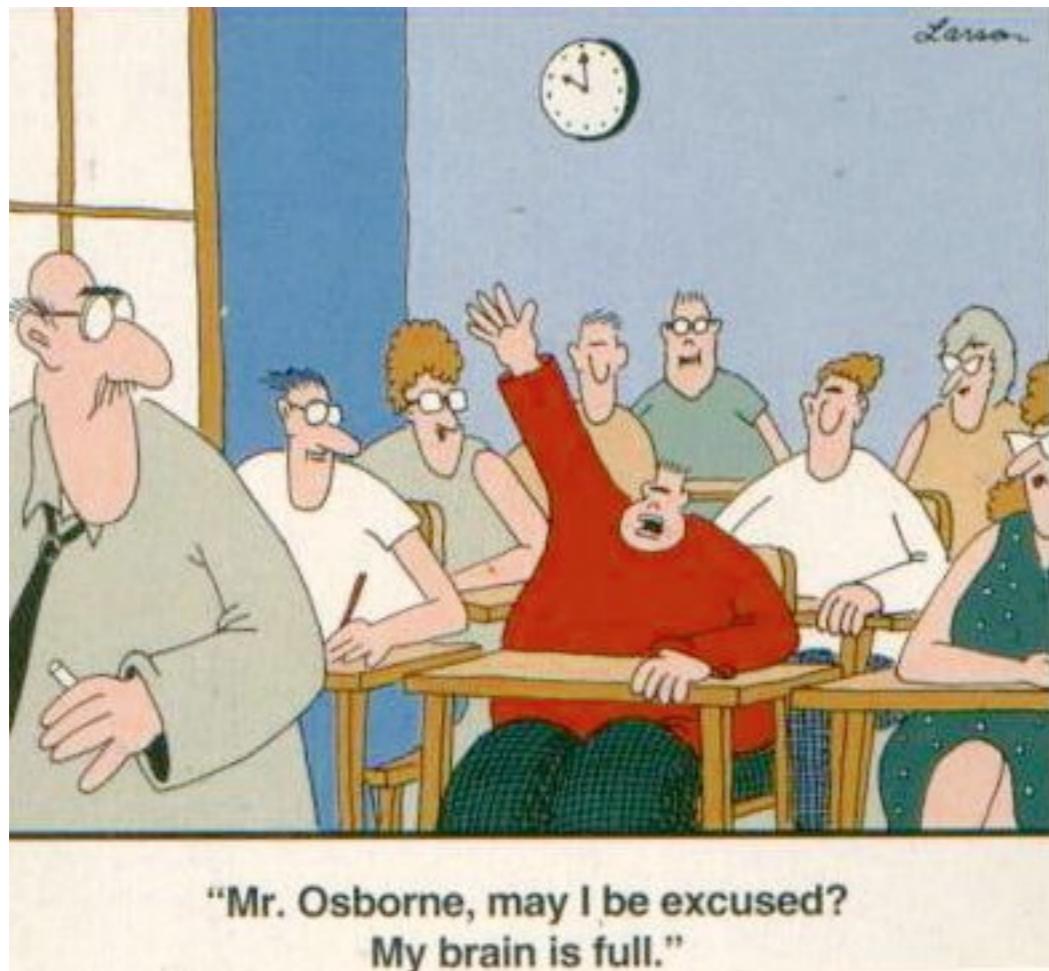
Think of something you do really well (or know a lot about).

How did you get so good at it?

Learning (teaching philosophy)

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

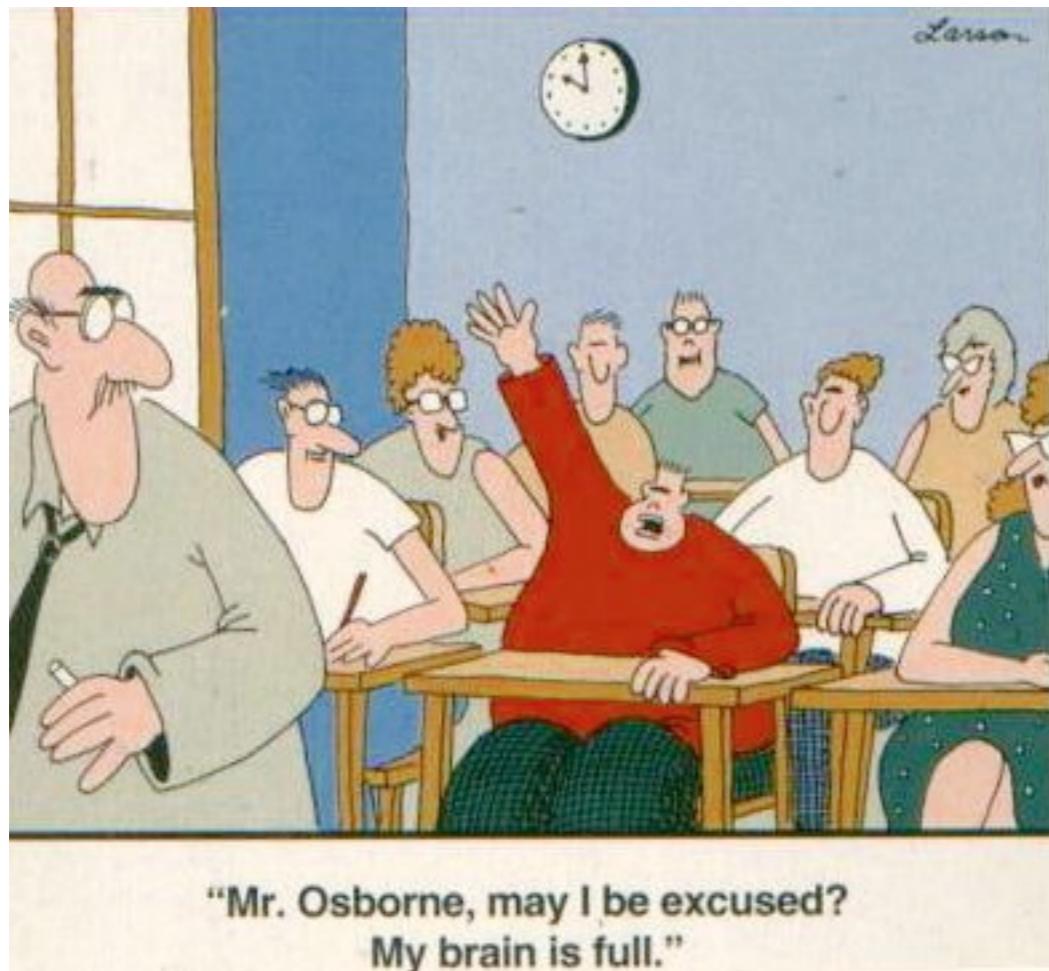
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Learning (teaching philosophy)

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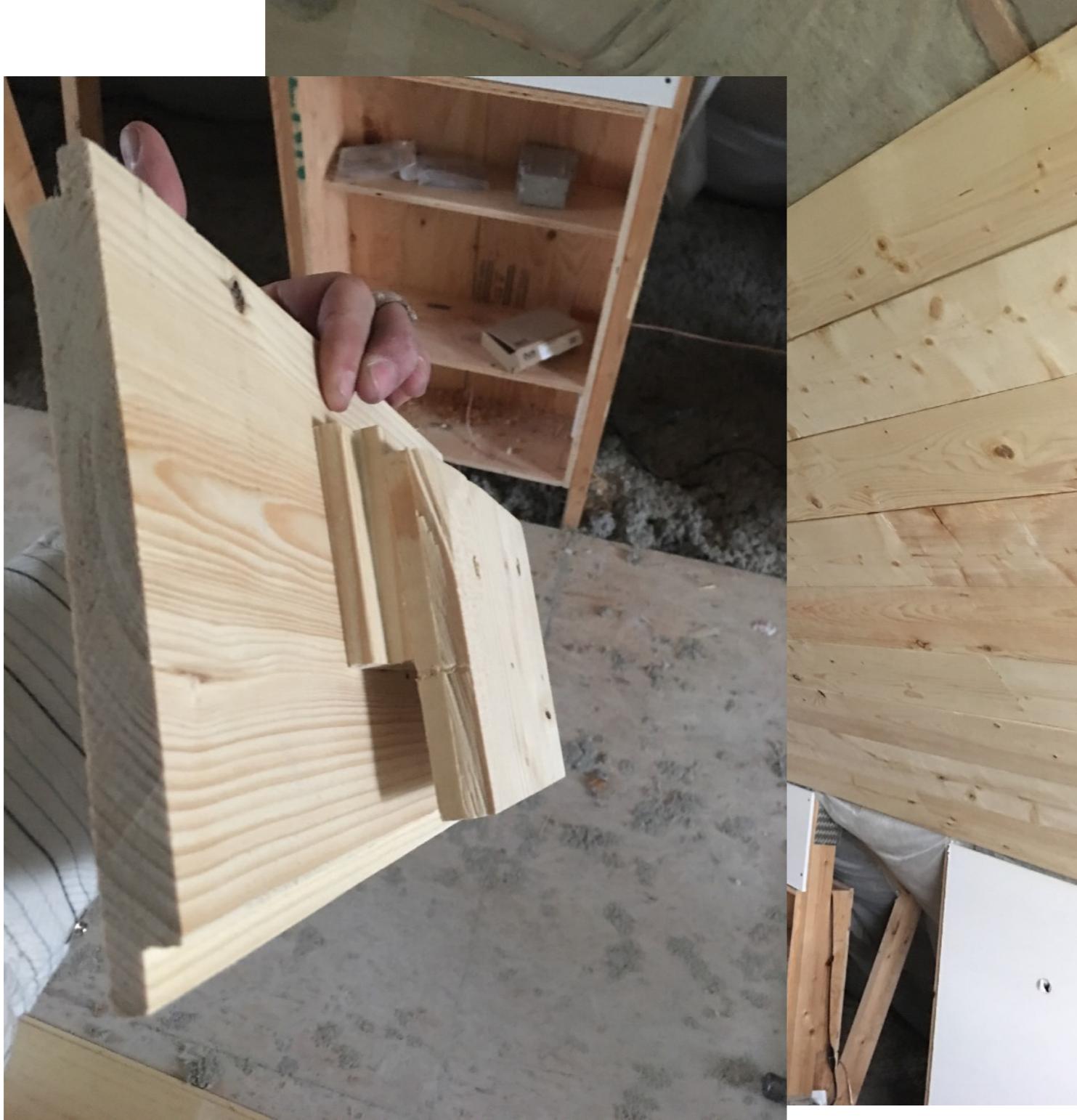
How did you get so good at it?



Spiritual Thought



Spiritual Thought



Spiritual Thought



Why did the Savior teach using parables?



Teaching in the Savior's Way

God sent His children to grow. He called us to help them.

Come, follow the Master Teacher.

Why did the Savior teach using parables?

Matt 13:10-11

Alma 12:9-10



Facts about learning

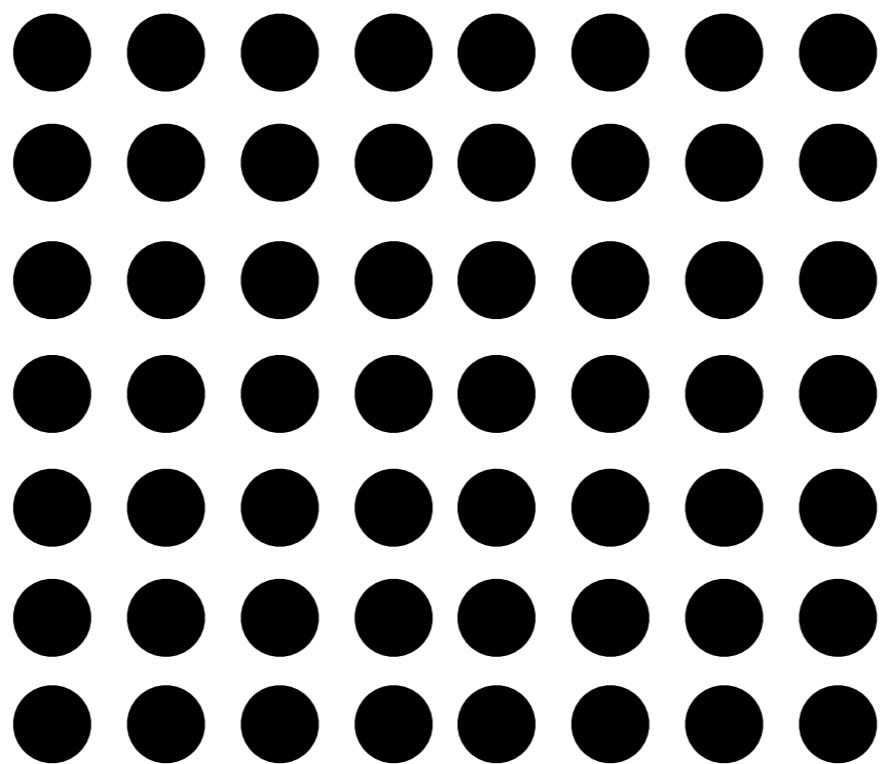
- Learning is deeper and more durable when it is effortful.
- Rereading text and massed practice is the least productive learning strategy (and most deceptive). make it stick
- Retrieval practice is a more effective learning practice. Quizzing yourself on key concepts after lecture is more effective 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).

The Science of Successful Learni

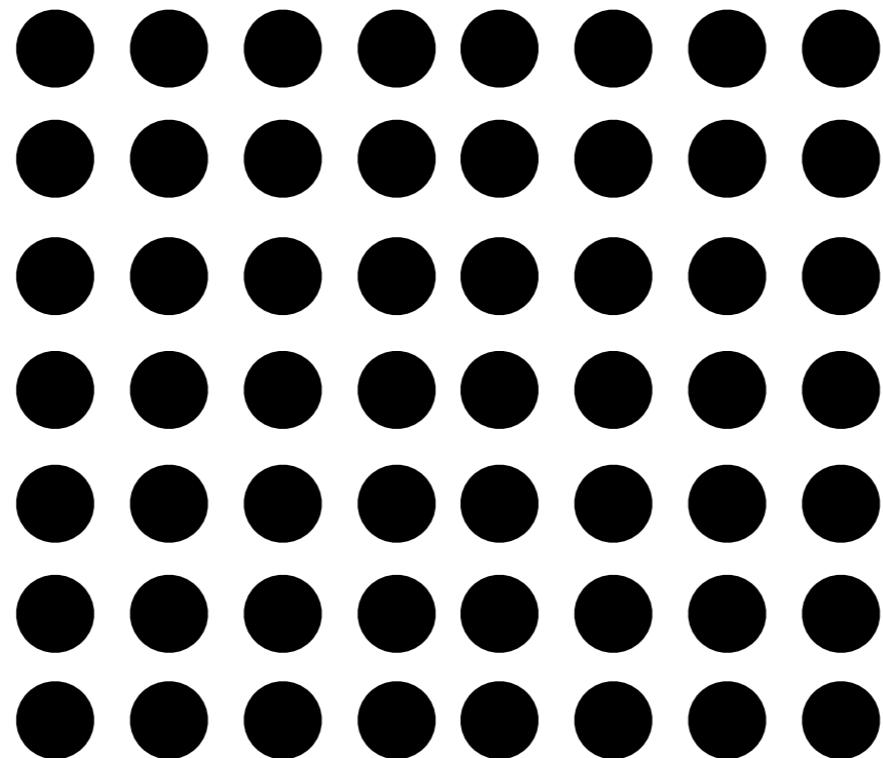
Peter C. Brown

Henry L. Roediger III

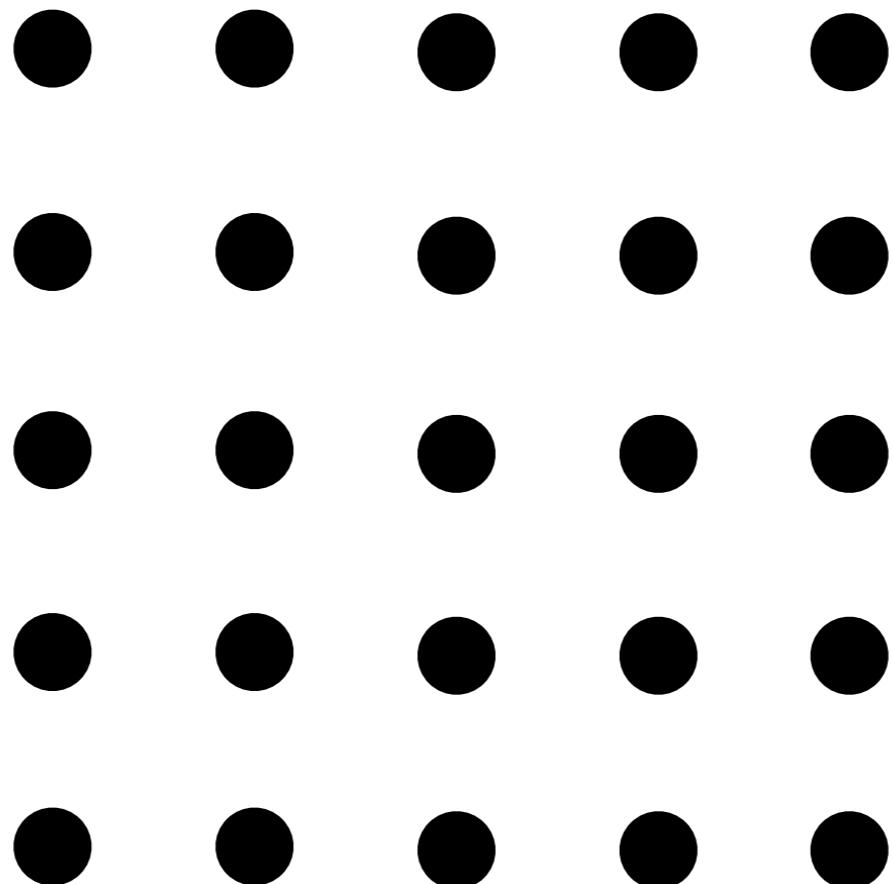
Mark A. McDaniel



Cold



Hot





Will the hole get bigger or smaller?

