Exploring and Applying Physics

Facebook group

Member's posts from 2024

Yam Can
January 1
.
I would love to use this site with my students. Any advice how to go about it? Any available resources they could be used with this as well? TIA
📸 Look at this post on Facebook https://universeandmore.com/energy...

https://www.facebook.com/groups/320431092109343/posts/1542382963247477/?__cft__[0]=AZXf1RfnGRJonDW4NG5nDJvU_VTMjCHtYcbKfeHmt5n1m25MyMK_Bl5Y0TVouMgUjKTtcJgLqQiYOlC61QppSfBnlniDa6pVHYo3po2vkScQlhoz0z-yH8WSqBZSJUy3JdKB8lDi8rBSbXLXD31UZsMCng21OFH8D1-mOyMP8p6jPZaACQQ5BmwbVI2YAfMhtoI&__tn__=%2CO%2CP-R

Anna Hermelin
January 10
.
Hi
I'm just have finished a course around this method and am now trying to implement it in my teaching. Something I can't come around is how or where I can find the alg activities. Have the first volym and waiting to get the second book but it seems to be some problems to get it. Is it something more I need to have?
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Gorazd Planinsic
Top Contributor
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January 13
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While you are preparing for the workshop on gases (with Eugenia on 3rd of February) , I am posting an activity on rigid body rotation, so we will also touch on this chapter (chapter 9 in the CP E&A textbook). In this activity, you will identify some tasks that are often present in new types of problems in our textbook and also in the AP exams: solving problems with real data, make a judgment about a hypothesis, based on data taking uncertainties into account.

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Meg Tredinnick
Top Contributor
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January 14
.
I have a question for the group. I am noticing multiple students struggling with the concept of the only force on a projectile as the force of the earth on the object. They want to include the force used to launch the projectile. We have been working with systems and force diagrams for awhile now. But I would love to hear suggestions to work through this preconception with them.

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Phyllis Rogg
Top Contributor
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January 15
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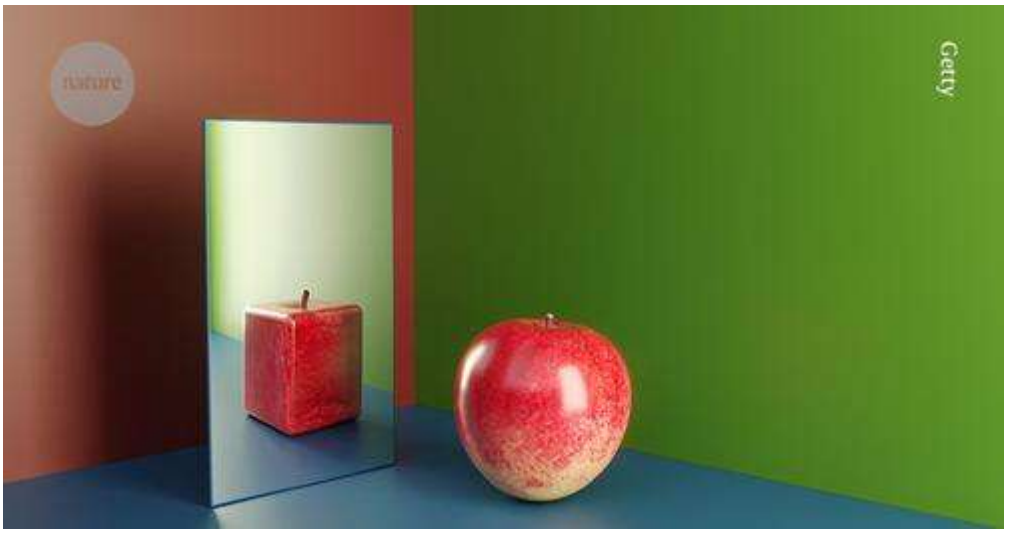
Thought of you, Eugenia, and the other stories you have shared of important women in physics...



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Michael Freeman

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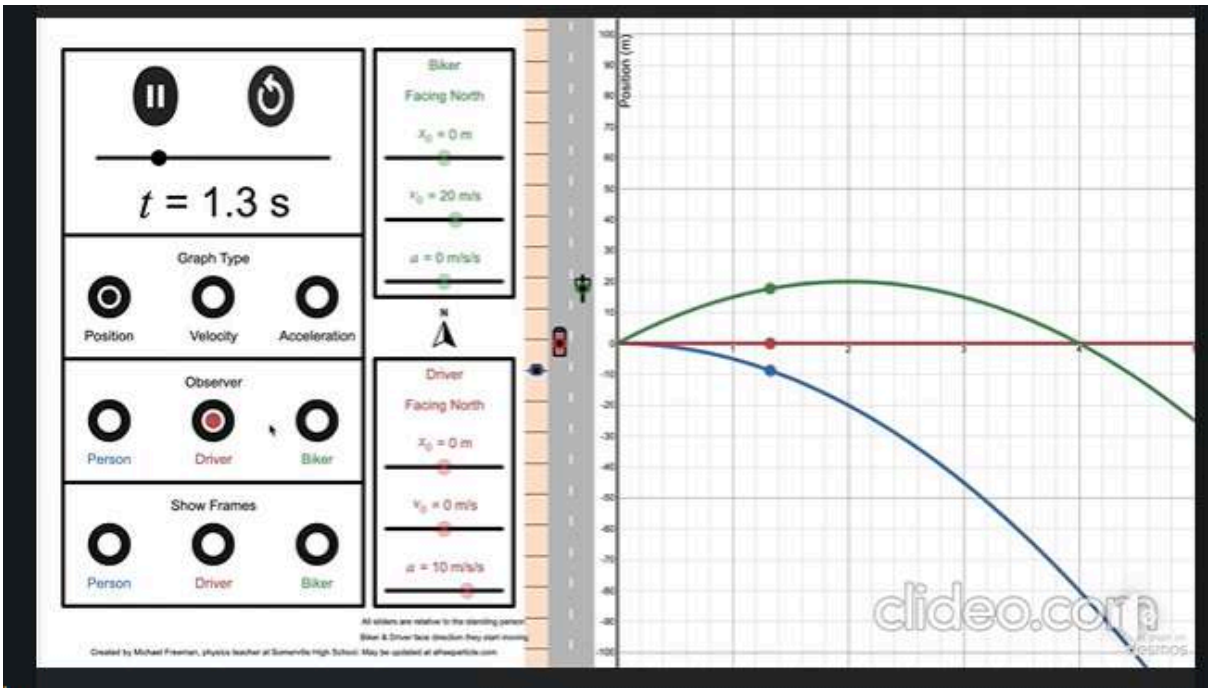
Just wanted to start off by saying that going through this textbook has made me think about teaching physics in great new ways! One thing I hadn't focused on before, but now see the importance of starting early on, is reference frames (not to mention that it was added to next years AP Physics 1 CED).

The way I understand ideas is by playing with them using sliders in Desmos. So I made this interactive simulation with the Chapter 2 introduction to reference frames in mind (Person biking between two observers, race between you and your sister, Xena and Gabriele on the bikes).

This lets you explore motion graphs for 3 people from the reference frame of each of them as observers. I haven't quite figured out how I'd use it, but curious if you all think it might be useful!

Link: https://afreeparticle.com/referenceframes.html



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Tom Prewitt
Top Contributor
. .

I am finishing a 7-8 lesson unit on dynamics and I am happy with it feeling I have covered the fundamentals. We've done the bowling ball in the hallway with a meter stick to relate motion and force diagrams. We've studied modified Atwood machines and fan carts to learn how acceleration varies with force and mass. And we've watched Eugenia and David on skates push off each other. We even got two bathroom scales and discovered it was impossible for one student to push harder on a second student than they pushed on them. I

feel complete but then I have a Ph D in Physics and I feel I'm cheating the students without letting them use these ideas to explain something in their experience. I could do the airbags application but I worry it isn't something they've ever wondered about. Is there another, more common "need-to-know?"

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Danielle Buggé
Top Contributor
. .

Hi everyone,
The Harvard PoLS-T network team is kicking off its spring virtual talks this Saturday, January 27 at 11 am EST. I am speaking about how the incorporation of formative assessment opportunities into an ISLE classroom has cultivated growth mindsets for my students. One of the many formative assessment examples I will highlight in this talk is a climate change escape room game created by Elana Resnick (Lana Res) and myself.
Please check out the links below for the full abstract, to register for the talk, and to join the network!
Danielle
Reminder!
The Physics of Living Systems Teacher (PoLS-T) Network invites all who want to advance the teaching of high school physics to join, especially physics teachers, physics education researchers, and decision makers in school administration and government.

Please register and Save the Date for the PoLS-T January 27 virtual talk!

SPEAKER: Danielle Buggé, physics teacher at West Windsor-Plainsboro High School South, NJ 2022 PhysTEC Teacher of the Year
TITLE: 'Thinking (and Failing) Like a Scientist: Cultivating Growth Mindsets of High School Physics Learners'
DATE: Saturday, January 27, 2024
TIME: 11am to noon EST
VIRTUAL via Zoom, and FREE.
Register now, at this URL!
docs.google.com/forms/d/e/1FAIpQLSedyXjSwWTOBOeJJqpA26SVphv3ywIucPtuUgQbktlu16mPnA/viewform

Harvard's PoLS-T Network Team is funded by NSF to strengthen high school physics worldwide.
PoLS-T LINKS:
Website: projects.iq.harvard.edu/pols-t-network
Join the PoLS-T Network here!: forms.gle/cj87TLRzJ6zcCEUL6
Twitter: @PoLSTNet
YouTube Channel: www.youtube.com/channel/UCRzn7nZ4f8JksXXUTrouSZg

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Jaya Ramchandani
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In my very first teaching gig in Shanghai in 2016, and inspired by the Ray and Eames 1977 Powers of Ten™ video, I created a card game for my students there. I've used this game in my classes since and it's always a rager (link to downloadable files available -- all Creative Commons and free). It may be interesting to this group. Enjoy! 🙌

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Eugenio Tufino
Top Contributor
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I recently went back to school after more than three years as a PhD student, and it is really great to see the students again as a teacher of their course. Before starting my PhD I had only known ISLE for a few months, through a distance summer aapt workshop, I was not yet ready, now I feel more confident. I make the students work with whiteboards on ALG activities and start to involve them in ISLE processes... This is very encouraging, also because in the Italian context there is a lot of confusion. There are no clear indications like those of the NGSS, on the contrary, school life is a continuous succession of external initiatives, which have a dissemination and frontal transmission character, not aligned with the learning objectives one should set oneself.

One of the things I'm struggling with is finding a way to propose the short daily tests for formative assessments, as Eugenia mentioned several times she did as physics teacher in Moscow. Doing them on paper is not feasible, I was orienting myself towards proposing a few questions on google Form, it seems more feasible, but I probably wouldn't have time to correct them all this month and the next one (PhD thesis...). I'm orienting myself towards choosing 5 or 6 students at random at the beginning of the lesson and only correcting their answers, then after explicitate the solution. Have you any suggestions?

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Emanuel Remi
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Hey everyone!
I am a course coordinator for a course in sustainable development. This is a full term course and the students have at least 30 swedish credits of studying (a full term of studying).
This course is already planned, but for the future I wonder if you have any ideas of how to implement more physics to the course. Note that the students don't have any physics experience from university before.
The idea I have is for them to learn more about weather and climate change from a physics perspective. But I don't know where to start and I would like to see what ideas you have.

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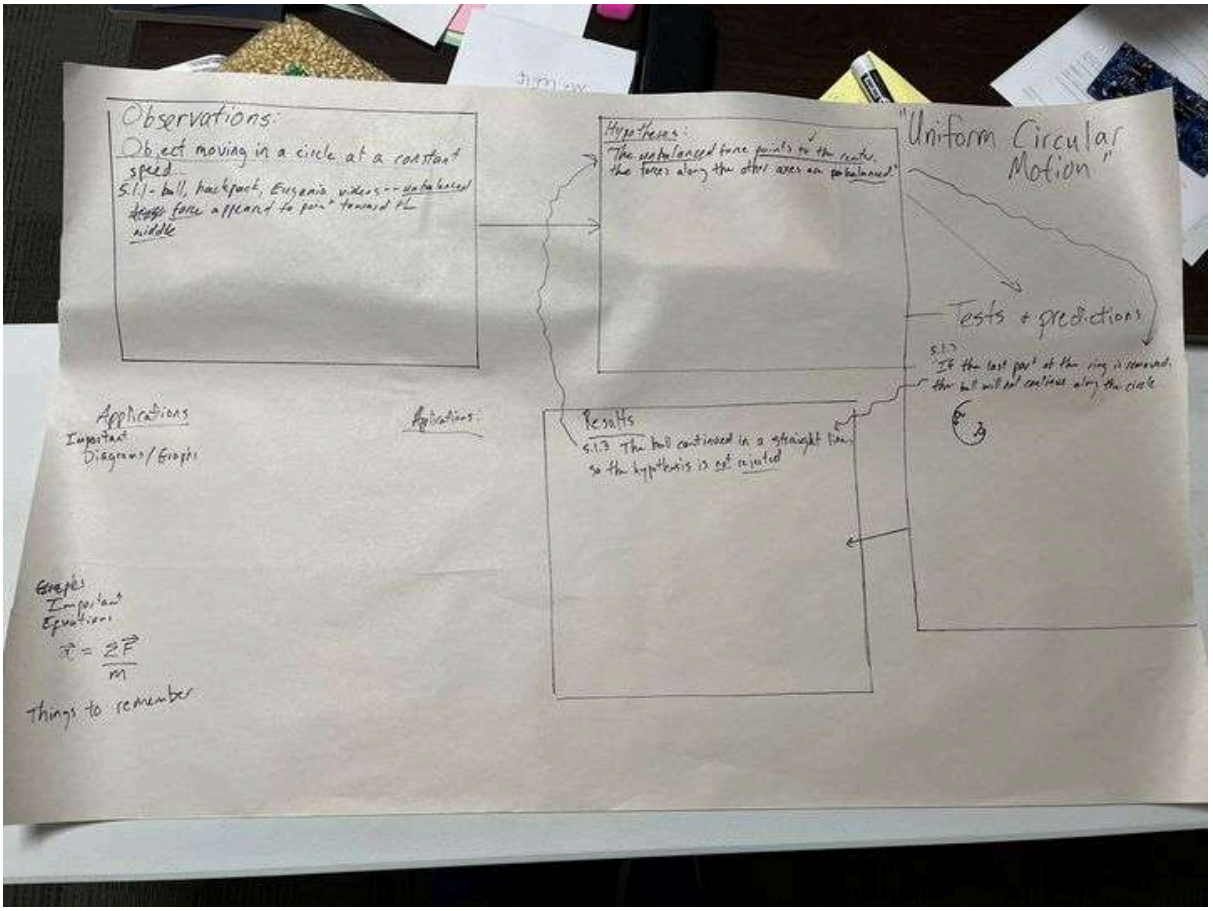
Paul Wolf
Top Contributor
. .

Hoping to keep the knowledge building cycle in the front of our minds! Will update the sheet as we go. I want my students to see how the “how to do the problem” stuff (all they care about, lol) falls directly out of the hypothesis development.



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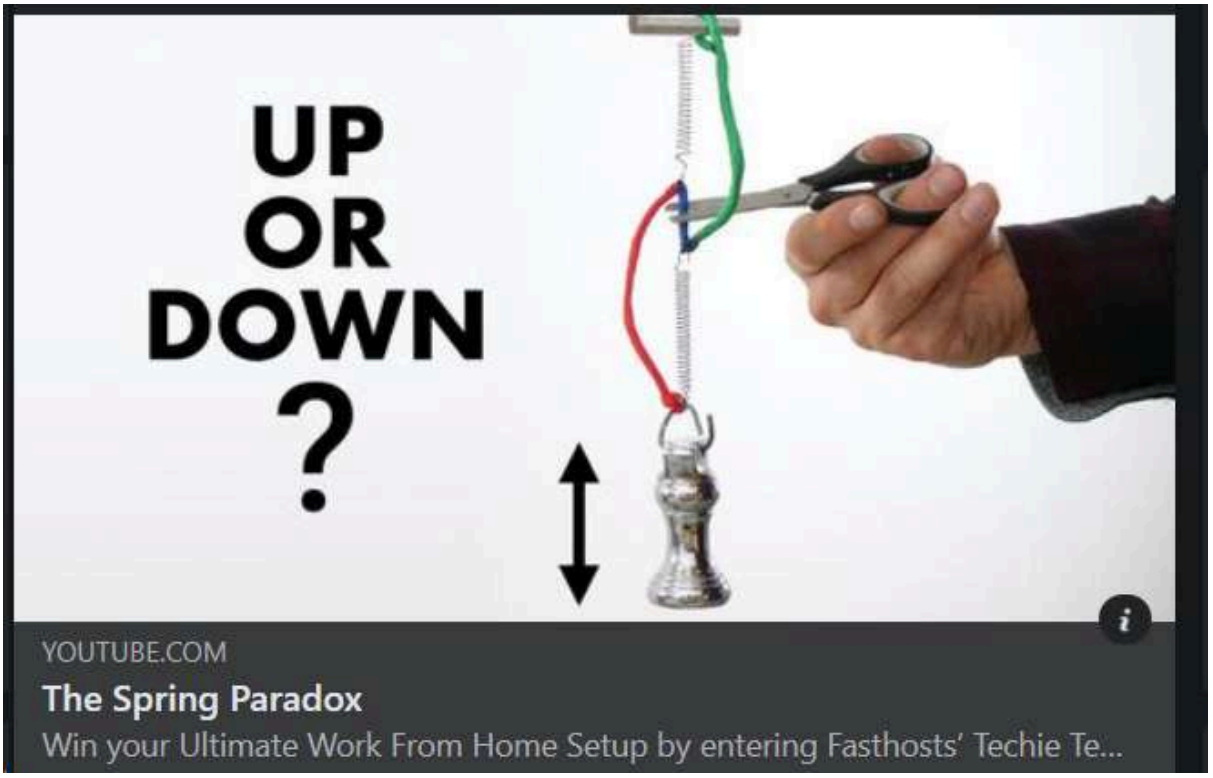
Eugenio Tufino
Top Contributor

Hi, Bor Gregorčič , who is part of this community, and collaborators continue to explore the groundbreaking field of the relation between large language models like Chatgpt and physics education and learning, this article looks really interesting:

https://www.facebook.com/groups/320431092109343/posts/1565200320965741/?__cft__[0]=AZVKRKfPc5l1Cp72r9UWewJ_IOXz7w3-2xBC3-SNU7WTQgxP8z5eONlZogcw5pzkaQbN1Elikz3nKWcCTOPYgExP8T6mBuu4EqzLYqNrqVa2fCpux0zQyCPhhxrx2yMqPb0HapiEiG5kGjomZyQ5DYR4poYxtL6FIkagBK-lXtnYnNF4TjDEZannG0u2SOiLP7s&__tn__=%2CO%2CP-R

Carolyn Sealfon
Top Contributor

This might make a nice "need to know" hook (pun intended) for springs in series vs. parallel:



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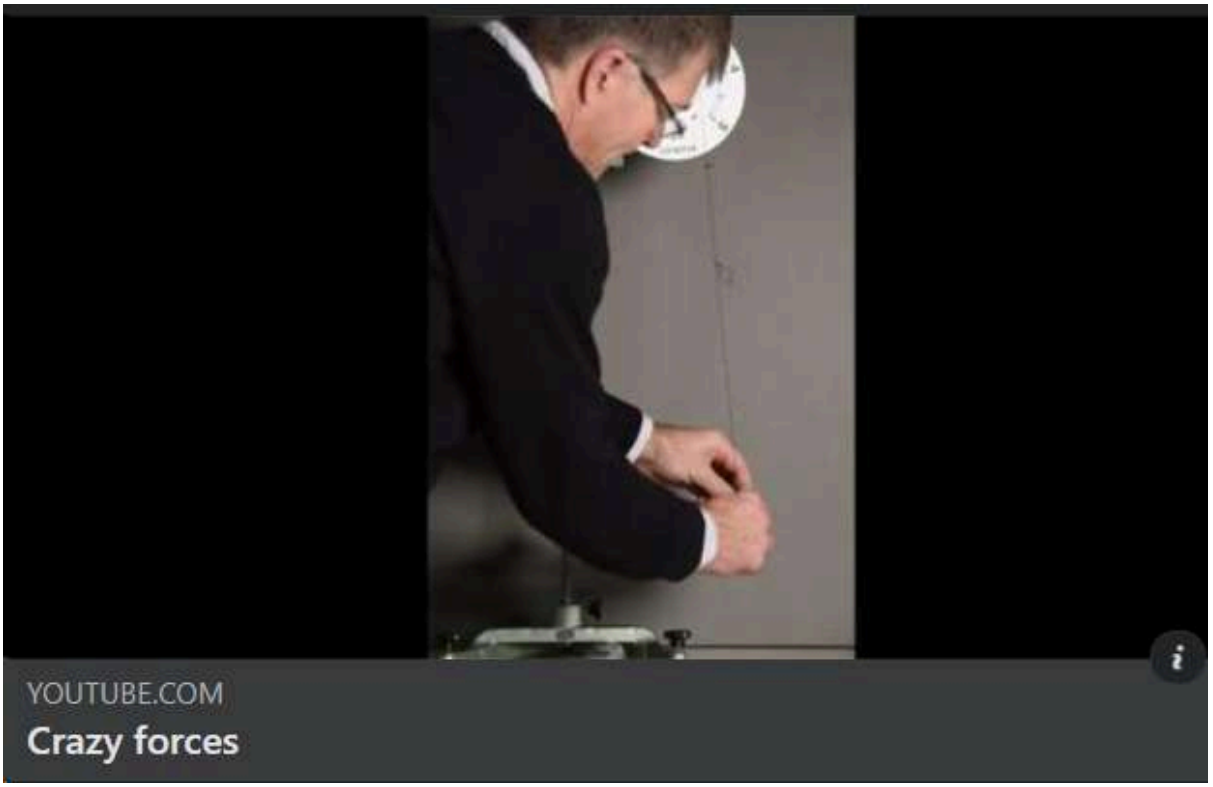
Gorazd Planinsic
Top Contributor

Yesterday, Carolyn Sealfon posted a link to a YouTube video of an intriguing experiment The Spring Paradox. As you can see in the video, the important part of the explanation is understanding the difference between the springs and ropes. This video reminded my of another experiment of this type that you can see at the following link https://youtu.be/Vv6517IEskA . As we normally do not discuss with students these intriguing differences between springs and ropes we should not ask students to predict, “what will happen” but rather show the whole experiment and then ask them (while working in small groups) to explain the outcome.



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Bridget Schober
Top Contributor
. .

Can someone give me a good way of explaining why holding the two leads of a multimeter in your hands registers a voltage? It's not much but it's not zero. I think it has to do with how the multimeter operates. Students do this all the time and I'd like to be able to explain it better

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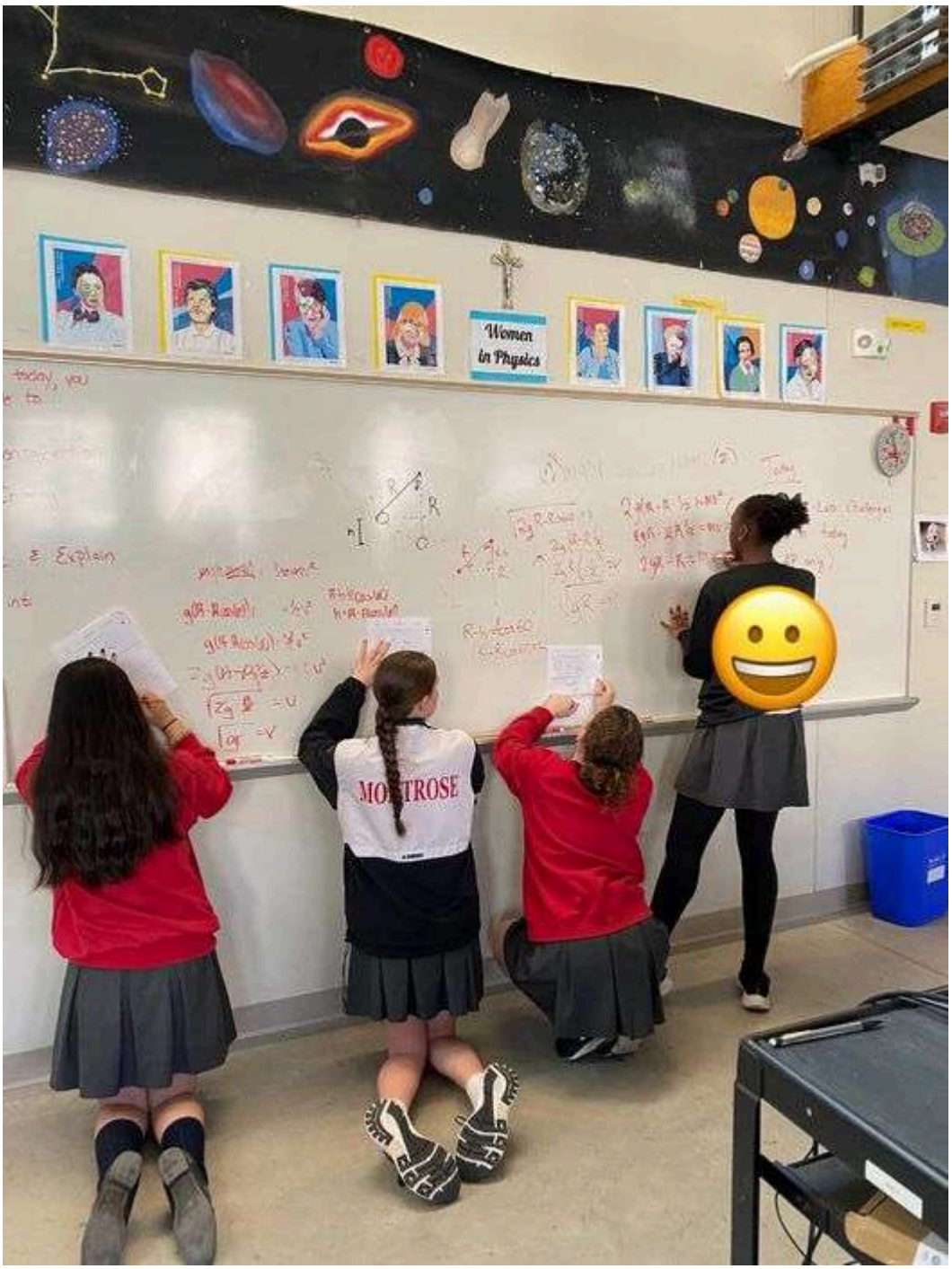
Kristina Pahor is with Valentina Bologna Longo and Roby Rod at Università degli studi di Trieste.
Top Contributor

· · Trieste ·
Well, a different post today… so thankful to this group for two amazing friendships. First ISLE three countries meeting🤩
Motivational and inspiring!

https://www.facebook.com/groups/320431092109343/posts/1569595920526181/?__cft__[0]=AZXxAXiHS6c__dVxhalWYdaGz0v6GUaSmFKaKpJLPeHHjrbAO7kr_ACfFNIAQv19jeYGjXeaKfT8NKxuRIISI_N0EX0GTezFkFB-caHnkIQPF5EYjLZBg4u8lAEPCpnM2k_TCNZt00klgFeU1UVbv_8115zCu1wgBz6NPyoSJoxrGzr90jNMUf2MuMoN68KP8OI&__tn__=%2CO%2CP-R

Allison Daubert
Top Contributor
· ·

Sharing a magical moment from my ISLE classroom in my all-girls school: I gave my students a difficult energy conservation problem involving a pendulum requiring a mathematical ‘trick’ they had never seen before. These four girls jumped at it with enthusiasm and excitement at the white board, each girl using her own marker to work the problem independently while they talked with each other. Once they arrived at the right answer, they grabbed their papers to copy the answer there. They worked together through the problem solving process beautifully and never once looked to me to help them. It was pure magic.



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Hisashi Kuriki
Top Contributor
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Now I'm studying misconceptions of students on their learning physics with many physics teachers in Japan. I'm also studying ISLE, but I cannot understand how to treat

misconceptions in ISLE still clearly. Somebody, tell me where there are documents or anything else about the treatment of misconceptions in ISLE.
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Judy Hall Ketterling
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If a plane was going down and you jumped out. Would you continue at the planes terminal velocity or slow to the terminal velocity of your weight
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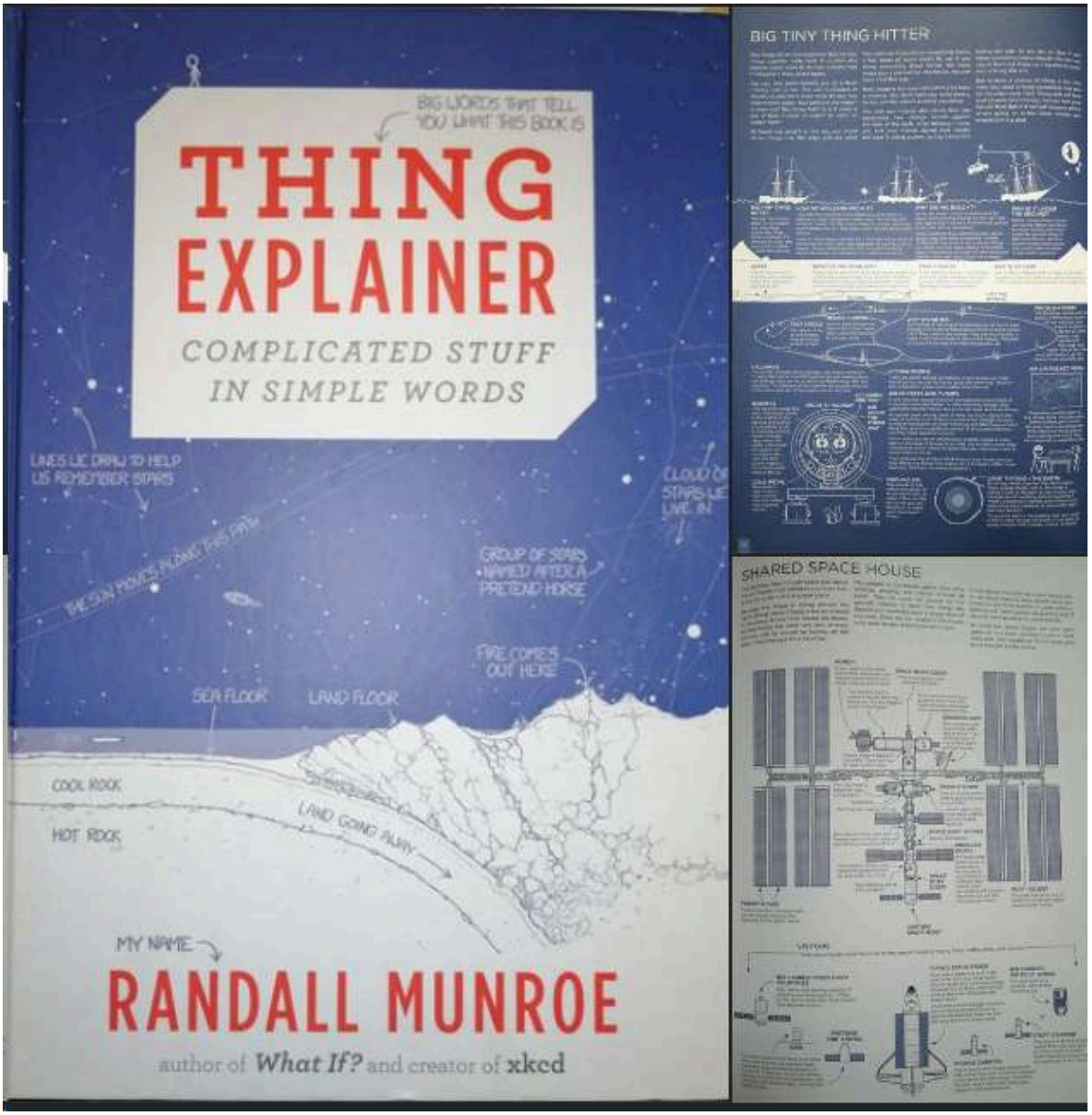
Hrvoje Milološa
.
It's often difficult for trained professionals to explain something from their field using simple words only. They automatically switch to fancy terminology.
I've came across a book that does the opposite: explains things without terminology.
It's called "Thing Explainer" by Randall Munroe.
This is useful for describing our observations in simple word ("the glass gets wet" vs. "water condensates"). It forces us to verbalize what we actually saw ("big round hole on top of mountain with fire inside" is "a volcano") and to think in terms of function something has ("large hadron collider" is "big tiny thing hitter").
The message of the book as I see it is:
For clarity- use simple words
For brevity- use special names (terminology)
Hope you'll find this book useful.



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John Gerber

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Hi all - I am looking forward to learning together with everyone. I'm digging into the PUM Physics I modules as I plan to use them for my freshmen honors physics course next year. I've run into a snag. I've discovered the teacher notes posted at the PUM site for Physics I Kinematics appear to be the exact same teacher notes for Kinematics II. As a result, what is described in the last few lessons in the Kinematics I student doc does not align with the

teacher notes. Is there a set of teacher notes for Kinematics I that do align with student activities? Or am I missing something in my reading of the posted teacher notes?
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Bor Gregorčič
Top Contributor
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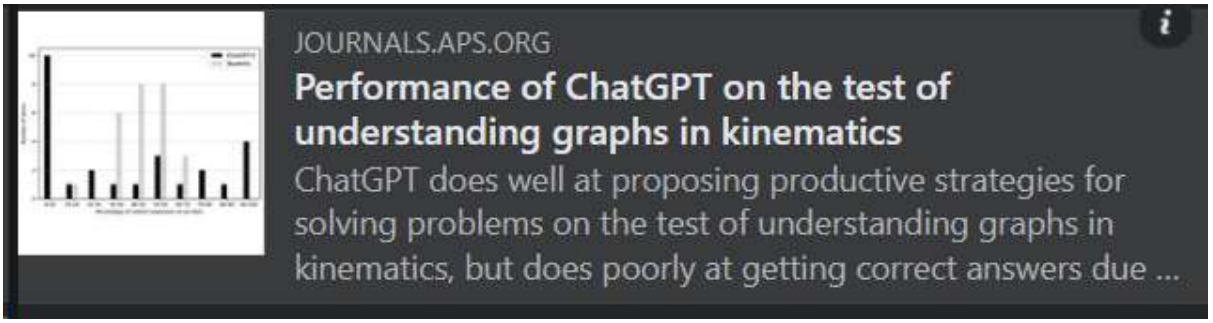
Hello folks! I know some of you are interested in AI and such. We have a new paper published in Physical Review Physics Education Research on the ability of ChatGPT to interpret kinematics graphs.



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US Marine

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Hi everyone, I've been pondering about the fascinating interplay between quantum mechanics and general relativity. It's amazing how these two pillars of modern physics, governing the micro and macro universe respectively, are yet to be unified. What are your thoughts on this? Looking forward to an enlightening discussion

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Lei Tang

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Modern Physics

AS a dual enrollment class, I need to teach the modern physics a little bit. I am planning to spend one week on it and only talk about the concepts. But there's too many stuffs I think they are important. Does anybody have a plan or worksheets about the Modern Physics which can share with me? Thanks a lot!!!

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Phyllis Rogg

Top Contributor

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What would you suggest as the best paper and or video talk by Eugenia to share with an admin that encapsulates ISLE approach and research best for a busy admin?

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Art Woodruff

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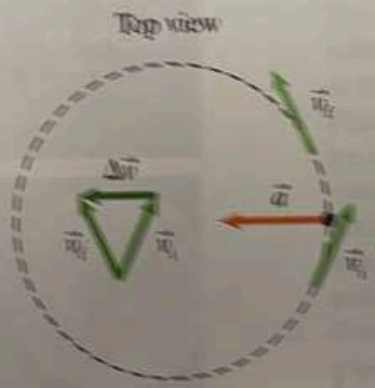
If is set up the circle with measurements, I get different values for a based on the two equations. Why is that? Is my math wrong or is my understanding wrong?

Summary

Velocity change method to find the direction of acceleration We can estimate the direction of an object's acceleration as it passes a point along its circular path by drawing an initial velocity vector $\vec{v}_1$ just before that point and a final velocity vector $\vec{v}_2$ just after that point. We place the vectors tail to tail and draw a velocity change vector from the tip of the initial to the tip of the final velocity. The acceleration points in the direction of the velocity change vector. (Section 5.2)



$$\vec{v}_{1i} + \Delta\vec{v} = \vec{v}_{1f}$$

or

$$\Delta\vec{v} = \vec{v}_{1f} - \vec{v}_{1i}$$

$$\vec{a}_{\text{av}} = \frac{\Delta\vec{v}}{\Delta t} = \frac{\vec{v}_{1f} - \vec{v}_{1i}}{t_f - t_i}$$

Radial acceleration for constant speed circular motion An object moving at constant speed along a circular path has acceleration that points toward the center of the circle and has a magnitude a_r that depends on its speed v and the radius r of the circle. (Section 5.3)

$$a_r = \frac{v^2}{r}$$ Eq. (5.3

Period and radial acceleration The radial acceleration can also be expressed using the period T of circular motion, the time interval

$$T = \frac{2\pi r}{v}$$ Eq. (5.4

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Rob Charles

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Good morning everyone, here is the info for the week long summer ISLE workshop that is run by Danielle Buggé and myself at Rutgers University in NJ from June 24th - 28th. We have had several people sign up and express interest but there is still more space! If you are not local Rutgers, we are able to provide low-cost housing at the University Hotel. The flyer for the workshop is attached and please feel free to email me with any questions at robert.zisk@gse.rutgers.edu
https://www.facebook.com/groups/320431092109343/posts/1576068893212217/?__cft__[0]=AZWJmCiMbpxorhb0TZzAEB5aYLnzb1Uvg785QXQeNxppJAJC2UaDs5C8lmZkvtphQ7pSoGzDWw0yt8lYslQ-xj41-n2xYfR_-uHXoJq4unMAiwhkVX-2cO1npgd6EXFUbOZHb1vFF93uX4YhEkhQFMKUPsQ5PQSmpUk6E0nHOQeNojpYepfebdC0nisIWooDqg-NG--a-al6U3kZr66BJ-7C&__tn__=%2CO%2CP-R

Andres Akamine

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Hi all,
Attached is the new AP Physics 1 Course and Exam Description effective fall 2024. I am a new teacher that will have to adapt the pacing (remove or go faster through some chapters) to teach it next year due to the changes. I would like to know how teachers plan the change. For example, how much would you cut from Chapter 5 circular motion or other chapters and then will you add what parts of Chapter 12-13. I use the ALG as the basis for the teaching and use all the pivotal activities (and I am behind for 2023-2024 year).
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Tom Prewitt
Top contributor

. .

My students and I are investigating conservation of momentum. The students really liked the lesson on apples (the difference between a quantity being constant versus conserved). I need to introduce them to impulse. Using the 2nd law and delta t's and delta v's is just not going to work. Is there an activity that would allow hands on discovery?
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woxUdohPnWi6KMR4AxAT-tUfrmmKHCXNZqQfaREJRjtMscMfohjU6cerQwJ1MjAMpRWrielNjusMJ&__tn__=%2CO%2CP-R

Jason Chung
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I have a question. How to find a great research topic for students who are interested in engineering and physics?

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Stephanie Hunt
Top contributor
· ·
I plan on attending the AAPT meeting in Boston this summer for the first time and I have some questions. Are the workshop fees in addition to the conference fees? Is the ISLE workshop similar to what I did at the summer workshop at Rutgers or something new? Thanks in advance for your insight. I'm paying for the experience on my own and am trying to be frugal.
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Paul Wolf
Top contributor
· ·
Question for AP Physics C: Mech (or anyone who has taught University level, etc.). Explore and Apply doesn't cover the rules on the AP CM test about (delta)U(x) = - W or dU/dx = -F . Is there a "way in" to teach this to students that is consistent with how we teach energy? I don't want to tell them to just memorize it. [Edited: -F_ext became -F]

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Gorazd Planinsic
Top contributor

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I am postig a brand new activity based on PhET, to practise the skills from the chapter on waves.

PheT simulation: https://phet.colorado.edu/.../wave-on-a-string_all.html

Initial settings

PULSE

AMPLITUDE: 0.75 CM

PULSE WIDTH: 0.20 S

DAMPING: NONE

NO END

SLOW MOTION

Activate RULERS and TIMER

a. Set TENSION to HIGH. Measure the speed of the pulse as it propagates along the rope. Take at least 5 measurements and determine the uncertainty of the measurement. What is the main source of uncertainty?

b. What is the force exerted on the rope if the mass of 1 m of rope is 500 g? Show the calculation.

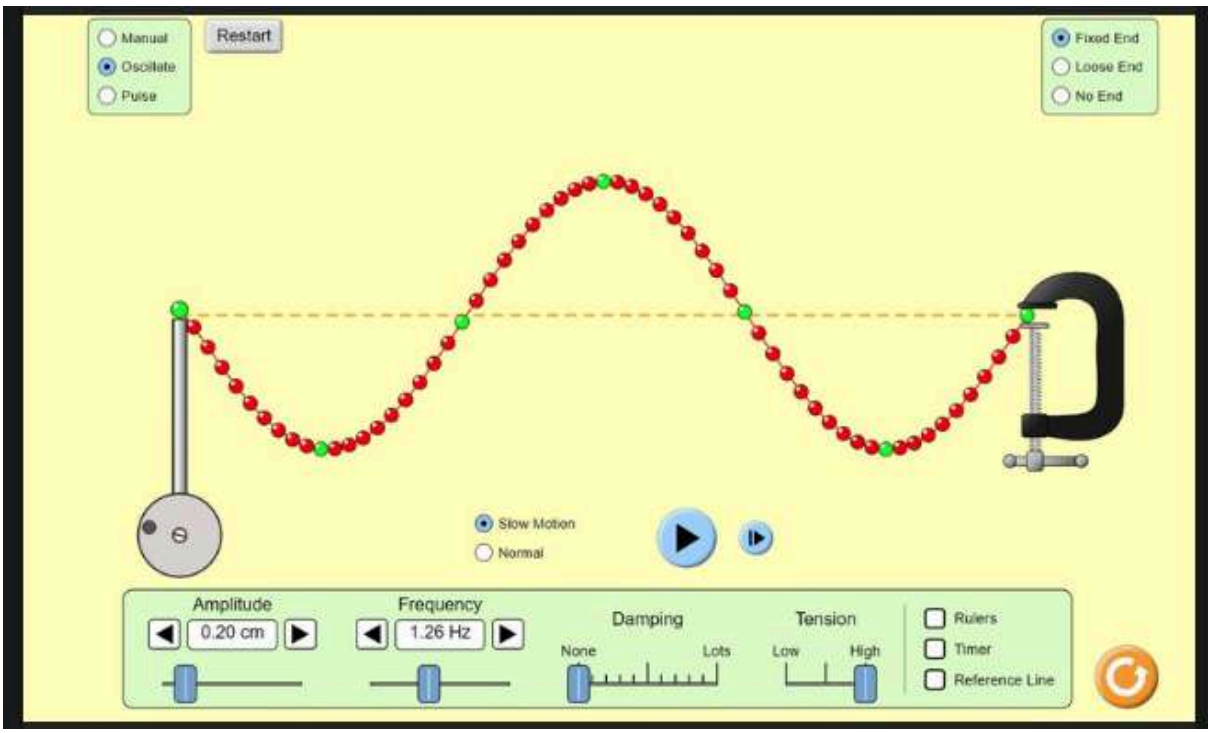
c. What is the force exerted on the same rope if you change the TENSION to LOW? Show the calculation.

d. Predict the wavelength of the waves that form on the same rope (TENSION=HIGH) if the end of the rope is periodically excited at a frequency of 2.00 Hz. Show your work.

e. In the simulation, select OSCILLATE. Set TENSION to HIGH and end NO END. Set the FREQUENCY to 2.00 Hz. Start the simulation and wait for a few waves to move through the window. Then stop playback and measure the wavelength. Does it match your prediction? How do you know?

f. In the next experiment, we will use the same rope as before with the length of 7.5 cm. We will oscillate the left end of the rope with a small amplitude and fix the right end of the rope. Predict what frequency we must set to produce a standing wave with two knots (in addition to the knots at the ends of the rope; the left end, where we excite the rope, will oscillate with a very small amplitude, so you can assume that there is also a knot there).

g. Set the end to FIXED END and the excitation to OSCILLATE. Set TENSION to HIGH, AMPLITUDE to 0.2 cm and FREQUENCY to the value you calculated in the previous step. Run the simulation and observe what happens (wait at least 15 s). Does the outcome match the prediction?



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Tom Prewitt
Top contributor
. .

A few weeks ago, I posted here asking for help finding a good observation experiment on impulse. I was probably too fixed on my idea of what "good" meant as several of you gave me ideas that I responded were not what I was looking for. Eventually though, I gave in and did the following. I bought a dozen and a half eggs and brought them to school. I had a few tablecloths (from that famous demonstration of inertia). I stood on one of my lab tables (kids loved it, administration would not have been so pleased). I dropped eggs first onto the tablecloth resting on the floor and then the tablecloth held a few inches off the floor. Then we had a "whole class" discussion looking for an explanation of why one broke the egg and the other didn't. It worked! Thank you to those who suggestions I was too fixed in my own mind to see the genius in. NOW, what would be a good test experiment?

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Hrvoje Miloloža
Top contributor
· ·

Few days ago a had an small incident with a vacuum pump. During operation a small amount of water went into the suction pipe. This particular vacuum pump was designed to pump gases and vapors only, not liquids so I thought it could be a problem.
I've turned the pump off, drained the water, left the pump in ventilated room and looked for manufacturer's operating manual for solution. There under Troubleshooting section I found something familiar (see picture).
First 3 lines taken together say something like this:
IF the pump is not working BECAUSE there is no voltage in the power source AND we check room fuse and switch it on if necessary THEN the pump will start working.
IF it stars working this hypothesis is supported.
IF it still doesn't work this hypothesis is rejected.
That's a a simple example of hypothetico-deductive reasoning at work in real life situation.
To put the whole situation in ISLE reasoning format:
OBSERVATION
The vacuum pump is not working.
HYPOTHESIS
The vacuum pump is not working because there is no voltage in the power source.

TESTING EXPERIMENT
Check room fuse and switch it on if necessary and turn on the pump.
RESULT
The pump still doesn't work.
CONCLUSION
The power source hypothesis is rejected. We need do come up with another hypothesis.
So, the troubleshooting section of operating manual is a good source of real-life hypothetico-deductive reasoning examples. Give it a try!
Can you make some other hypothetico-deductive arguments using the pictures in comments?

Pump does not transfer	
Cause	Fault remedy
No voltage in the power source	➔ Check room fuse and switch on if necessary.
Thermal switch has operated following to over-heating.	➔ Disconnect pump from mains. ➔ Allow pump to cool. ➔ Trace cause of over-heating and eliminate it.
Connections or lines blocked.	➔ Check connections and lines. ➔ Remove blockage.
External valve is closed or filter is clogged.	➔ Check external valves and filters.
Condensate has collected in pump head.	➔ Detach the condensate source from the pump. ➔ Flush pump (see Section 8.2.1).
Diaphragm or reed valves (valve plate) are worn.	➔ Replace diaphragm and reed valves (valve plate), (see Section 8.3).

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Valentina Bologna Longo
Top contributor
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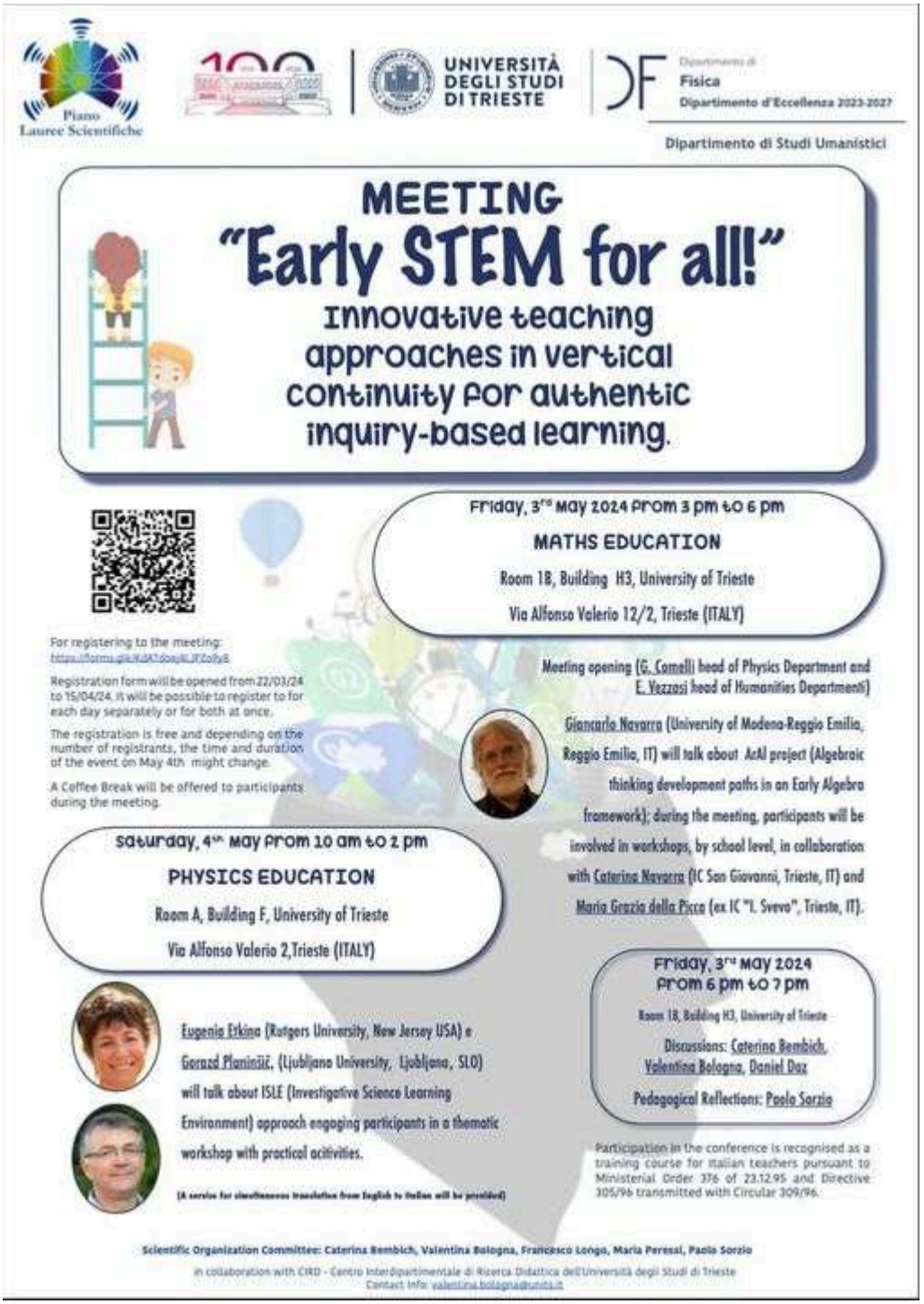
Hi all! Francesco Longo and I are very pleased to inform you that the registration form for the meeting events in Trieste in May is opened. Here we share the flyer and the link for the registration:
https://forms.gle/KdATdoej4LJPZo9y8
We hope to see you soon!



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Peter Kaplan
Top contributor
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Question about Physics and NGSS.
I'm in the middle of an earth science unit required by our district. There are _so_ many HS-ESS standards compared to the standards that address Physics. And the test-banks of 3-D questions used to assess science have plenty of HS-ESS and are exclusively on the non-physics side of HS-PS.
It really feels like Physics is disfavored in the NGSS community.
Am I mis-perceiving the trends or is there a need to advocate for physics?
The earth science is cool, but honestly, it's hard to give students hands-on experience with earthquakes (except for those who survived one before immigrating to the US). By way of comparison, physical experience is accessible in the classroom.
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Matthew L. Jacobs
Top contributor
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A meme for the all the hypothetico-deductive reasoning fans in the house:

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Nicole Kellogg Murawski
Top contributor
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Preparing to teach fluids? This is super cool!!!
https://www.facebook.com/share/r/JFqtxKh1e7n4RZ8A/?mibextid=0VwfS7

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Julia Brodsky
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A free pre-conference event for teenagers interested in space science - in case you know some students who may benefit from this.
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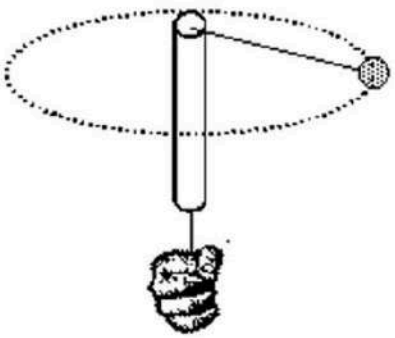
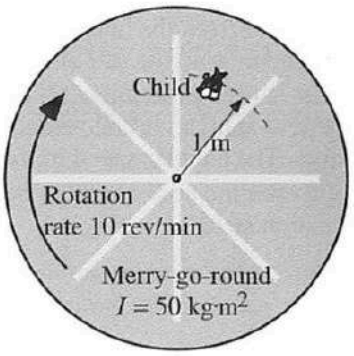
Anonymous member
.

I need some clarification regarding angular momentum and rotational kinetic energy. I feel pretty comfortable with the whirligig (WG) but something's not clicking with merry-go-round (MRG).
WG: How do you explain to students that the kinetic energy changes while the angular momentum remains constant when the string is pulled downward or released upward?
MGR: How do you explain to students that the kinetic energy changes while the angular momentum remains constant as the child moves towards or away from the axis of rotation?
All examples, analogies, and scripts are welcome!!!





"Whirligig" (WG) Merry-go-round (MGR)

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Amin Rainy
Top contributor

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Dear all,
One of my goals in summer is to read the following paper to teach better in my studio class. ISLE has so many benefits and also challenges for me.
https://www.facebook.com/groups/320431092109343/posts/1600125950806511/?__cft__[0]=AZW4XyDwJTAw4WVoDp0REBo1zJ2xCRxzanJqF0FIlHKOaMZ-mx9FD1y3WPbvrM3hZnT7ZssNjJrR648JblvpN8DzUF8SxRazO62aVXNp6Uvv2Zlpk4_qdxNvCVWAgARPXbi8wztoS0BTKN5lBbNKfkZssyqyW-Vw1yxsMPhQfduyFjyrkfsFWkdvxDo924yt-Ft4dTpfwV_oth_LSNYe4usy&__tn__=%2CO%2CP-R

Amin Rainy
Top contributor
. .

Dear all,
My class ISLE process goes slower than I expected. My students enjoy the process and their scientific skills such as communication, graph and diagram analysis improve dramatica dramatically.
I am thinking to give my students some online ISLE labs and ask them to do online experiments individually before they come to the class. Is anyone have a similar experience? How did you address it? I followed instruction of Eugenia Etkina and give time limitaion to complete each lab to the class. It works and improves my class momentum and they do their best but giving more momentum to the class is benebeneficial.
I know David Brookes published a paper known as “Comparing students’ learning and development of scientific abilities with apparatus-based versus video-based experimentation“ and it seems combination between these two different lab based has some benefits but my experience shows everything depend on circircumstances. I am thinking about students individualy work on pre-lab (Online lab) in home then come to the class and work with equipments as a group in class.
I am thinking about using Pivot interactive as pre-lab activities.
https://www.pivotinteractives.com/
Thanks for your time and support.
https://www.facebook.com/groups/320431092109343/posts/1600497437436029/?__cft__[0]=AZXZPU7OPshoMtaJmbamd6fXtE_8TEjsUxvPCoQZg-n2wQ7ViW2J13Ec-uFkFZhuxbi7NaAxv7EZEV4nXmdJW_DF5xg3LUUHTJWXHmwGDIOF38Pb69nIrKQIlV1TbWk7CJV6BLBsOKpZNm-kJCuPbQcKlr1uM5g97xDxVe9b11kFTFOtdmuPTBXqZGgVQo3QzJXS35ar5jSyiAerQzpar2fv&__tn__=%2CO%2CP-R

Anonymous member
.

Since its inception, I have taught the AP Physics 1 along with both AP Physics C courses (Mechanics in the fall and E&M in the spring). For many reasons, I am not a fan of the AP Physics 1 curriculum and exam, but I am very pleased with APC. I have been asking administration to allow me the opportunity to exchange AP1 for an honors-level physics course for five years, and - FINALLY - they are willing to meet to discuss it.
If you were given the opportunity to make an argument for switching to an exclusive honors-level physics course, what would you say to convince administration?

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Marta R. Stoeckel-Rogers
.

My district is adopting College Physics: Explore and Apply starting next year and I am working on a list of the materials we will need to purchase. I know the Active Learning Guide lists the materials required for each activity, but I was wondering if anyone has compiled that information into a list, ideally with what chapter(s) an item is used in listed?
https://www.facebook.com/groups/320431092109343/posts/1603258047159968/?__cft__[0]=AZWXhuj1pUYtFtki5tkvl_uIfgtQNtWZmXLtifsvcYJYZPHYOc3h0xjGwK6JmsbJKpcJK__kmZ5AsJENiZVW-lpnF05CI-V_9G5liEF-AygkzCVB5zzfimIfSE4aZCdzdZKveLy_Lq0i2vrTkSNWkxe-p1SpigZdzDwocr0cz8IVnkO1G7yrOiyE6JuZCA4mARYBNzb_65N-TxQn830tu8mF&__tn__=%2CO%2CP-R

Bridget Schober
Top contributor
. .

What is the answer to end of section 23.1 review question? It asks whether you see more or less of yourself when you are closer to a mirror. You see the same when you are far from the mirror but when you get really close you see less. I think it is getting at the “buying a mirror” conceptual exercise but reality is if I get really close eventually I won’t see all of myself. What am I missing?
https://www.facebook.com/groups/320431092109343/posts/1603866433765796/?__cft__[0]=AZVNEm4dOGAnwoCILDRTfDnVCn-d2fSfIQH-Q7Un0ycKgDhc7Osiyb5BjfRhls4AuZwB83i1MGwKAJJE85uy_65eKmXn53D6o6yHZ5b1-plWEpQeBlzP7Ne3ab8QfDBmznINEj7A2CdP3z3gUMR7xOiWjMaX1a9WKEW6NK1K80Zq9xzrYB79bs5PAvbnCpsDHU_pnyiJYizzcp4llqMhrGV-&__tn__=%2CO%2CP-R

Anonymous member
.

What would you look at / calculate / determine in order to rank bulb brightness in an ideal circuit?
https://www.facebook.com/groups/320431092109343/posts/1605090953643344/?__cft__[0]=AZWO9-hFdABeq2rgTCeVWHMkPJK8tSIiAOeKhJ8Z50uU0iW5Pag354rJdPScGhVJx1n_vNPABe8pOJKMU1862V7I8Xd3wXjhzGe-p6MoX81uBrDvJ1nBN079Xrz7rHixyQ_UMfPw0vzblaqEgmg37P9tP0_jxZyf9OAUTDIXmw-Z9K4SehSVPal2je722gNtXK4wJftqCOSOfp8WUkhUGznjPV3UGp3qBb12aeRbaMqMyA&__tn__=%2CO%2CP-R

Tommi Holsenbeck
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Tommi HolsenbeckAAPT_PTRA
Moderator
. .

Free Professional Development Workshop for Pre College (K-12) Physics and Physical Science Teachers
July 10-12, 2024
• After AAPT Summer Meeting on campus at Worcester Polytechnic Institute, Worcester, MA.
• Topics: Video analysis, Classroom Practicums, TIPERs,
Make & Take plus more.
• Stipends available to help with travel and equipment for
participants in K-12 classrooms.
• Go to aaptptra.com/workshops to apply.
• See our 2023 Highlights https://youtu.be/3jEU22IMgTI
• Deadline May 20th, but invitations will start coming in April.
PTRAs Contributions for 35+ years https://youtu.be/-VsAkLSf5F4

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Joseph Wachs
Top contributor
. .

Next semester I will be taking my LAST Masters class. For the class we have to read and report on any book that deals with Science Education. I'm looking for any book reccomendations. I've read the ISLE papers, are there any book length documents on ISLE, or even Physics Education book recommendations would be appreciated. Thanks Joe
https://www.facebook.com/groups/320431092109343/posts/1607316483420791/?__cft__[0]=AZX5U3HGCRGB9j5fWbV7vX062oLVOJmyN9n9e38TifmHuMY7S0xRcEBReY9LNiRp-btGghj_htxYV-f38TVSki3mtxSqKF-DaDk7CxLw_W1_MrcHLxwD3gsHLR8rf4tJensRa3LVMo4c0

xe3P2hqRhIKEwitxkfhv09XCKRk7rdp6kK9q7CT5-DgXleAdiJTSY8tNdumhGYQjgAJL9Zs0O2i&__tn__=%2CO%2CP-R

Christina Friddle
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I want to give my Applied Physics class a project or report to wrap up the year. It would be completed in class and the students would have a week to work on it. Has anyone ever done anything like this before. Does anyone have any ideas? Thank you.

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Jared Betz
Top contributor
. .
Hi everyone! I've been wrestling with a problem a student brought to me, and it's a fascinating enough question that I thought I'd bring it to you all. Consider an infinitely long conveyor belt with a box on top of it. They start from rest and then the conveyor belt has a constantly increasing acceleration. At first the block will accelerate along with the surface of the belt, as the relative velocity between them is zero and static friction accelerates the block. Once the belt's acceleration is such that the net force required to keep the block accelerating is greater than the maximum static friction, the block will start to slip. At this point, what is the ultimate fate of the block? Assume the belt continues increasingly accelerating. This is really testing my concepts of relative velocities. I'm having trouble thinking about the dynamic of kinetic friction in this interaction. Any insight on a good way to think about this would be greatly appreciated!
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Bor Gregorčič
Top contributor
. .
Hello folks,
thought that some of you might be interested our latest paper on ChatGPT. We tried to see if the chatbot could be used as a model of a student for the purposes of training teachers in asking guiding questions. Asking guiding questions can be done in many different (more or less productive) ways, and I realize that the term "Socratic" can be interpreted in somewhat different ways, some of which are not necessarilly the most productive. What we mean by it is responding to students (or the chatbot) not by directly validating or invalidating their

responses, but rather asking questions that will direct students into re-examining their reasoning themselves. I hope this proof-of-concept paper can spark some debate and perhaps give food for thought.
https://www.facebook.com/groups/320431092109343/posts/1609684363184003/?__cft__[0]=AZVQ4vGlCmfK1LXifFREOyNX_gbvAKpK936tZuZqYD764jr8vb-R0UNbPFkCFZCtVynmQF40-x67s92pNZZ72E76RNf9-NIRoS2EWtApSVsjDXIA8BAl4gmPchtHRSma9kcQe9Khxu1LyNZy7n27ZK2yW5c5tKm9mIoWgKjeVUAwprhkFCTS5t8WEb9GLPmmDiazdkGC9kiYMPzDH5DRN93T&__tn__=%2CO%2CP-R

Erika Lyn
.
We are working on a unit on waves for our physics first freshman. We would like to have students record different sounds to see the wave it creates and follow it will a series of questions. Has anyone done something like this? Is there an accessible site students can use to record and see this data?
https://www.facebook.com/groups/320431092109343/posts/1612287109590395/?__cft__[0]=AZXXPmIzWrCQeVP5xbAeeXzxMaAuqahwV5ZBtXTtqsqw-49WMIDGX8cO-cA1JPK36CIbrvR4nB1KuoY_WC3N4NOJdqxxYE8OSgXCFGDLPgkBtVYH-rAx5cNnL-FgF1K3F-6m36BJui7ztF8dVwbtFUMduH_BbRDCwXsB9sdsio0T-eYJnoxm-vFsp3s0EX41dAkXLf5Cf36upo-9K7pDYkDj&__tn__=%2CO%2CP-R

Paul Wolf
Top contributor
. .
Two things:
First, I had a flash of inspiration at the end of class yesterday! Not sure if I can share here due to the copyright stuff, but I am giving my kids snippets of the official solutions and sample responses to create "Jeopardy" and "Find the Error" problem types. I made these out of the first set from 2022. I will have them do set 2 the regular way, and see how that goes for them.
Second, I am noticing my students revert to "intuition" when solving AP problems. Any advice on how to get them to bring it back to the models we've developed, tested, and applied so far, beyond reminding them?
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Stephanie Hunt
Top contributor
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Today is the last day for early bird registration for the AAPT summer conference. I am looking forward to meeting my ISLE friends in person at the ISLE workshop on Sunday.

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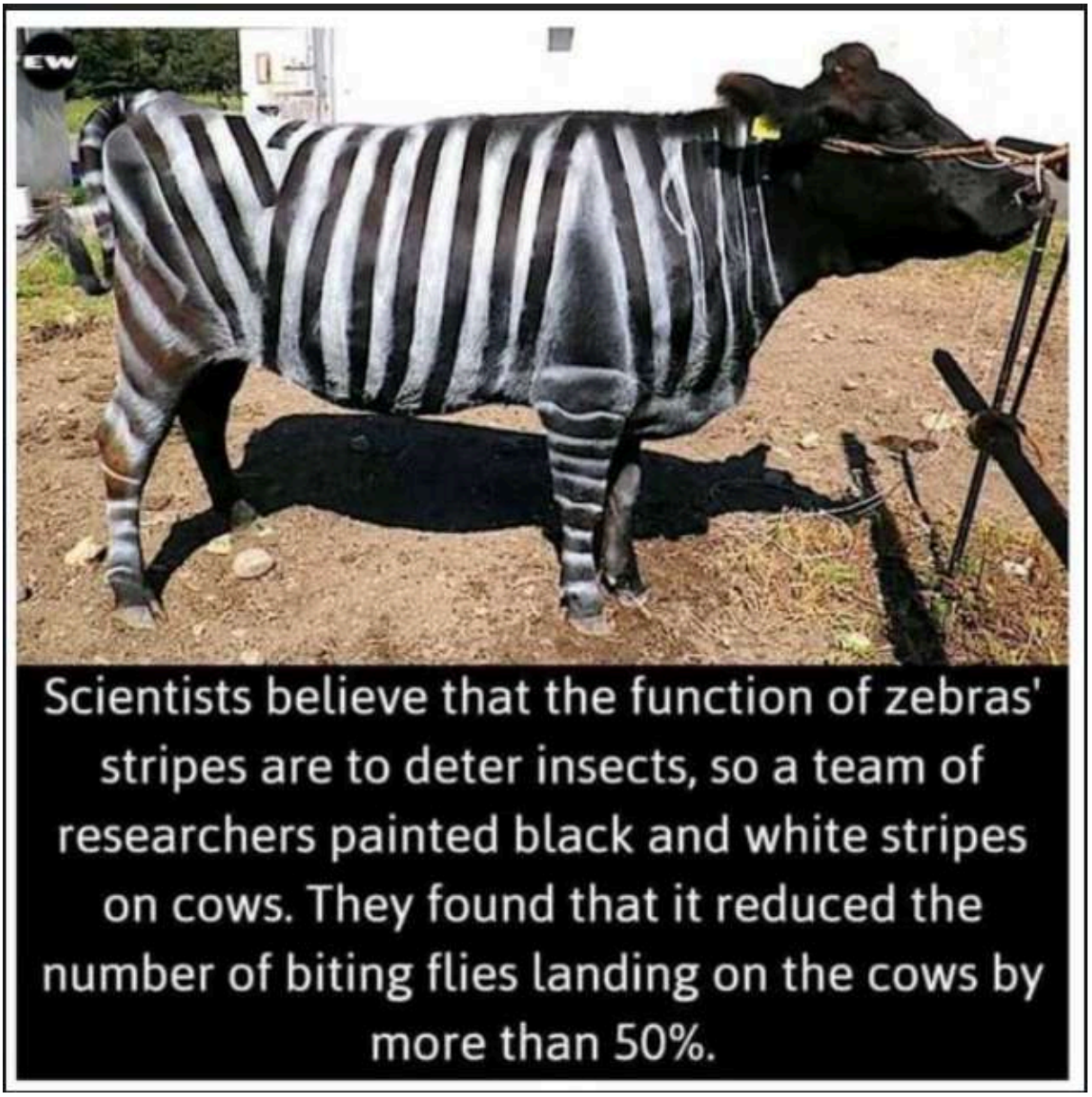
Eugenio Tufino
Top contributor
. . .
a testing experiment in a different field!
EDIT:The image is from the "Science Humor" 🙂 group on Facebook and posted by Helen Humphreys.



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Ai6BF4SE11GfNs4lgEBpoPX1OqloGVUY1wHVn9hAq2QwWvkA1CwmBK4uskJkuaHcrXpcWcl1yNc_n&__tn__=%2CO%2CP-R

Christina Friddle
.

I would like to purchase an infrared sensor for our classroom. Does any one have recommendations or information on the best one to get that can be used for many areas including optics. Would I need more than one for the classroom? Thanks in advance for any advice.

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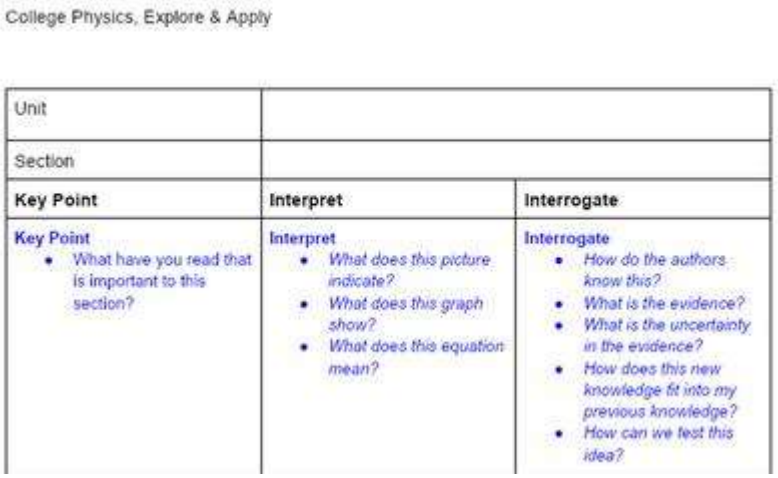
Allison Daubert
Top contributor
. .

This upcoming year, I will be trying a new strategy to teach interrogative reading. As students read each section, I will ask them to take notes by hand in this document. Students should identify up to three main ideas in each section, then interpret it (what does this mean), then interrogate it (how do we know this is true). I have given students prompts in the first row in blue to help them at the beginning, but will eventually move that row out of the document once students have it down. Feel free to make a copy of this document to adapt and use with your students if you would like.



College Physics, Explore & Apply

Unit		
Section		
Key Point	**Interpret**	**Interrogate**
Key Point • What have you read that is important to this section?	**Interpret** • *What does this picture indicate?* • *What does this graph show?* • *What does this equation mean?*	**Interrogate** • *How do the authors know this?* • *What is the evidence?* • *What is the uncertainty in the evidence?* • *How does this new knowledge fit into my previous knowledge?* • *How can we test this idea?*

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John Weisenfeld

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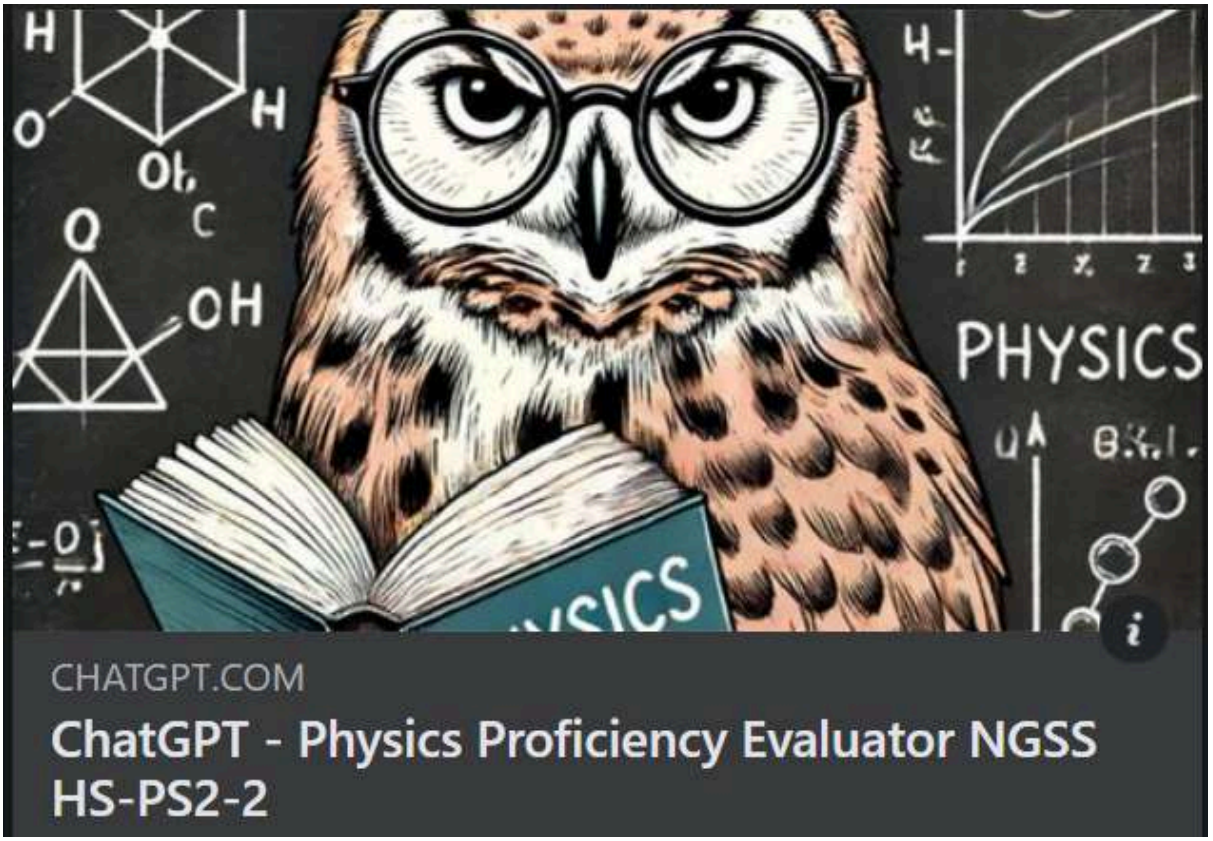
There's a ton of "Physics Tutor" type GPTs. But I wanted to write a "Physics Assessor GPT" This is a draft, but the concept is: "can my student(s) persuade an AI that they understand, and can explain and can apply a given standard?" I call it ABC = Assessment - By - Conversation.



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Oliver Moose

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HELLO FELLOW AP 1 TEACHERS (and everyone)! I was wondering what adjustments, resources, equipment, etc. everyone is planning on for the changes to AP1, specifically the addition of Fluids.

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Carolyn Sealfon
Top contributor
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Invitation:
PLAYTELLIGENCE: Play & Learning Beyond Borders
Free Online Global Playshops, June 28th & 29th, 2024
Can learning be more playful for both students and teachers? How can we play practically and philosophically in learning, teaching, problem solving, and communicating?

Join us on a journey of discovery at Global Play Brigade's June 2024 Global Playshop. Engage with teachers, students, researchers, lovers of knowledge, readers, educators, and learning enthusiasts from around the globe as we explore the transformative potential of play in education.

Event Details:
Dates: Friday, June 28th 8:00-9:30pm EDT and/or Saturday, June 29th 10:00-11:30am EDT
Location: Zoom
Registration: https://www.globalplaybrigade.org/global-playshop
https://www.facebook.com/groups/320431092109343/posts/1642252643260508/?__cft__[0]=AZUQaXNbJj61g3E8jNfnYb9YbDCFIY_tRdVLnyFpK254MFBmRL6b-PGsMaVM986478RPJPGJNLT6Jm7g20RRZAUvVoxwTI4dNIHCxj-iV4bv8sHo8cxUlcyBwQlO-qnq-epbVcQwWz_g4rS_x8ctiooOQ8llidPnY93stO6iBvr8KCPVwlZTihHpBFFnpPBssb2NkdKfsaiMvzr4HfQTxjJ-&__tn__=%2CO%2CP-R

https://www.facebook.com/reel/494313229796987

Danielle Buggé
Top contributor

Hello,
The ISLE Chemistry team is hard at work creating an ISLE-approach first-year chemistry curriculum. The first three units are ready to be piloted in high school classrooms. We are looking for a few individuals willing to try out and offer feedback on these materials this fall. There are three possible ways for you to become involved:
1. Pilot the first three units with your students and provide feedback
2. Review the materials on your own and provide feedback
3. Pilot some of the activities with your students and provide feedback
There will be an orientation zoom meeting the week of July 28 and we will schedule check-ins throughout the year. We will have a culminating zoom meeting after the first three units are complete to discuss your experience with the materials.

If you are interested in being involved in this pilot, please complete this brief Google Form (https://forms.gle/5bKbE9VLHHPqguVj9) by Monday July 8. More information, as well as resources, will be shared after the form closes.
Thank you,
The ISLE Chemistry Team
https://www.facebook.com/groups/320431092109343/posts/1646502656168840/?__cft__[0]=AZUQHYg0BcEqOxcH04A7eRmAMQSS5ijL6nDq_g-_CJLwzFCupJjKKn5gW_hO2QhdqxcU2JeN-qEhj7Zb8F2esNQXuYbkR53eAGg-SusPv5uyBmUBtg9-5ORI8zpKwH33WBs7MeHdmFdzYQ5HPnhH_TVc79ae8NJK52HXlPwsE7VBKH3g7pbyQvHqin9K9GN3atXhP-Y1vX8t7i7uH_zBJS5E&__tn__=%2CO%2CP-R

Lars Londot
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Any fluids options? The new AP 1 curriculum has fluids. Thank you.

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Eugenio Tufino

Level 2 contributor

The book I ordered has finally arrived! I'm a bit old-fashioned, but it's so much better to work with a printed copy!

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Irene Ning-Lee

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(Cross posted)

Could I please share some wins? I'm currently writing college rec letters, and I ...do not enjoy the writing process. As I slog through the brain dumping and composing, here are a couple student questionnaire nuggets I've loved that are helping me stay motivated (edited for brevity, clarity, mechanics):
"Block [x] made it one of my favorite classes I've taken in high school and in turn, taught me a lot about myself that I didn't know before. Before taking this class, I was generally pretty quiet and reserved in school. But, through spending time with Ms. Ning and other teachers in and out of the classroom, I learned that I could be very extroverted in a classroom setting. …I collaborated with others more, asked questions and participated when I was scared to before, and for the first time in a long time, looked forward to going to class instead of dreading it. Block [x] was hands down the best block this year."
"Never keep anything to yourself. Ask the teacher or peer a question because chances are someone else may have the same question and it's a simple way to uplift everyone with you."
"I learned that learning is full of trial and error and it is important to make mistakes in order to advance as a scientist. If you never make mistakes, you will never learn the source of error and the uncertainty of the task at hand; personally, this is a key idea that I find most intriguing about science, especially the idea that a majority of science is uncertain but the collection of different ideas and various forms of evidence can support a particular claim. Physics is my favorite course … at [our school] and all the experimentation, collaboration, and hands-on activities have allowed me to grow and showcase my love for [it]."
"one specific time … I was partnered with two of my peers... Both … were confused and not sure how to tackle the problem, but … I knew how to solve it. Instead of telling my group the answer, I walked them through the process by giving small hints and relating separate parts of the problem to other questions that they knew how to solve. They ended up solving the question correctly and one of them thanked me for my help over text that night. I was proud of myself because I knew I had evolved as a classmate and learner. In prior years, I would have stayed silent, too worried about the possibility that I was also wrong. I was somewhat controlled by a lack of self confidence, and I used to think "if they don't understand it, why would I know the answer?" …in this class, I learned to be confident in what I know, and I also learned to help my classmates learn on their own instead of simply giving away the answer. …this instance…set a model for me of how I wanted to continue acting in this class and all my future classes. This class taught me that it is possible and even preferred for me to learn in a group setting. Before this year…I was scared to meet with teachers, ask my peers for help, and correct my peers when they made mistakes. Learning with others, who were just as confused or just as new to a topic as me, made me feel more comfortable asking questions and helped me … expand my comfort zone and … become more confident…. Learning is not always linear, sometimes you need to take a step back and reassess. … It's okay to be wrong! No one is perfect, and even the people who you think are geniuses also get problems wrong. Sharing and being wrong is better than always staying silent."

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Allison Daubert

Level 1 contributor

Hello from the AAPT Conference in Boston! This week, I had the huge pleasure of bringing 4 of my high school students with me to the AAPT conference to present our peer review project between my classroom in MA and Danielle Buggé's classroom in NJ. The power of ISLE was found in students who felt so confident in their experiences as physicists that they could go present their work amongst physicists. There are *lots* of great talks this morning at AAPT from our ISLE colleagues! If you are there, please check them out! If you need help connecting to find a great ISLE talk this morning, just let us know!

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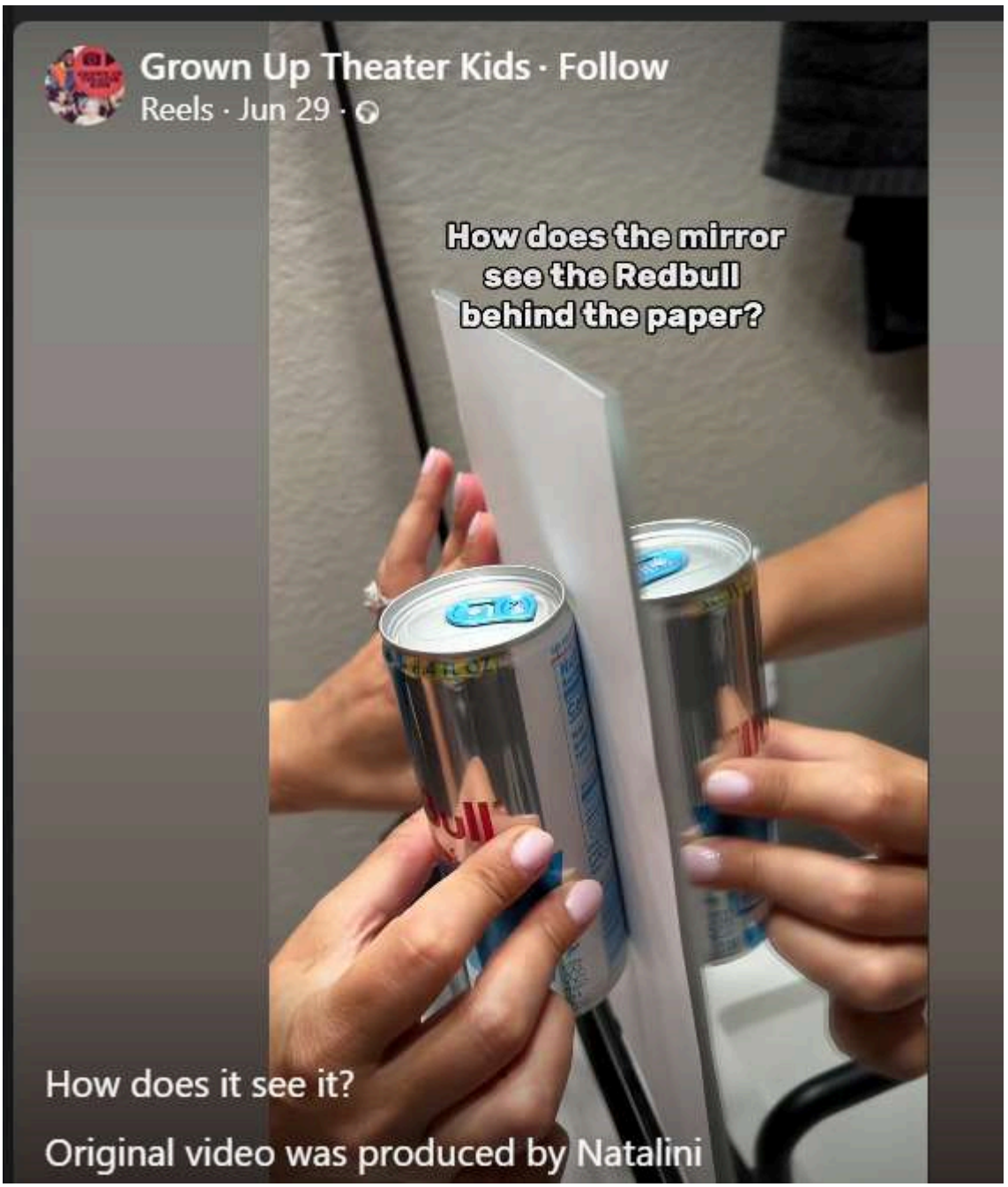
Bor Gregorčič

Level 1 contributor

This is a silly video, but I totally get it, mirrors are weird and especially nowadays when people are more used to screens, they do exhibit unexpected properties. Could you use this video (or observational experiment like this done in class or at home) as a motivation for the unit in geometric optics?
https://www.facebook.com/share/v/nku7A173FVpmiQ47/
(I am not sponsored by an energy drink company)



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Christina De Bianchi

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Hi all -
This is my second year teaching AP Physics and last year I had used a book that I did not love. I found Etkina's book (hurray!) and realized school is right around the corner and I am pressed for time (aren't we all?). I was wondering if anyone would be willing to share their list of assigned homework questions and problems for each chapter? Thanks a ton in advance.
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Sam McKagan

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Is this still the best link to find ISLE video experiments, or is there something more up to date?

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Meagan Sundstrom

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Hi everyone! We (Eric Brewe, Adrienne Traxler, and I) are working on a study of Active Learning in Physics through the NSF supported CALEP project (Characterizing Active Learning Environments in Physics). We are recruiting faculty participants for the study who are implementing ISLE in their introductory mechanics courses (college level) this fall.
Faculty participants will be asked to provide the following:
a course roster prior to the start of the term so we can develop the electronic network survey,
time in class (~5 min/time) to complete the survey during the first week and tenth week,
three consecutive videos of their class (cameras will be provided), and
pre/post conceptual inventory data.
Faculty participants will be provided $1,000 for completing the data collection. Please let me know if you are interested in participating, or if you have any questions!!
(ms5629@drexel.edu)

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Amin Rainy

Level 1 contributor

Dear Gorazd Planinsic , which model and brand of high-speed camera do you use for recording ISLE experiments.
Thanks in advance.

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Paul Wolf

Level 1 contributor

Here's an odd one: I have a section of Physical Education (technically called "Personal Fitness for Life") and would love to bring physics and ISLE thinking into the class. Any already existing resources I can use? I have taught the course before so I am not totally out of activity ideas, this is just something I've want to do for awhile.
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Tom Prewitt

Level 2 contributor

Last year, with a lot of help from this group, I decided to ditch grading. I told students, "It's your learning - you grade it." I then evolved to a system where I kept the assessments but thought of them as data for the students. After the formative, I'd ask them to reflect - what did you learn, how'd you learn it and - not very important to me but required by the school - what grade should we assign it? This year, along with bolstering this system in some other areas, I would like to support students in setting realistic learning objectives for themselves.

I'd like to do an activity the purpose of which is to identify some realistic objectives a student could set for herself - things like, "I will get better at using equations to represent situations." Does anyone have anything like this? I'm including a link to Dr. Tao's Ted Talk because I love it - you should watch it if you haven't - and it makes the idea of setting a personal objective, an authentic objective that is both worth working on and one that you'd know you met (like doing a "360 flip on a skateboard).

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Eugenia Etkina
Admin

Level 3 contributor
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Hi all Exploring and Applying Physics people! Several things today! Our community continues to grow at a very fast pace and I continue to welcome new members. My post for them will be at the end of this message.
First, I want to remind those who signed up for the Magnetism workshop on August 245th that i posted homework a few days ago here and in the workshop EVENT announcement. Please prepare!
Second, I want to finish my posts on kinematics. Those who are new to the group, please scroll down and read them in alphabetical order. There are common questions that people

ask me about teaching kinematics. I will answer them here. If you have other questions, please put them in the comments.
How long should kinematics take? I recommend 6-7 weeks not more. WHY so short? Because doing kinematics longer will not help them learn more but will bore them. I also recommend not doing projectile motion in kinematics. It is in the second chapter on dynamics in our textbook for many reasons. First the students are not ready for math yet and second, they cannot explain why a projectile moves the way it does. If your students do not master kinematics graphs by the end of 6 weeks, do not worry, they will be using graphs all year and eventually they will master them.
What are the most important ideas that students MUST learn in kinematics? Here are my thoughts: a) the concept of a reference frame and the idea that all motion descriptions depend on the observer. WHY is it needed? One cannot understand Newton's first law (mistakenly written in most textbooks) without understanding the role of the observer or an inertial reference frame. b) a motion diagram and most importantly how to draw velocity change vector. WHY? Because velocity change vector will help your students decide the direction of the sum of the forces on force diagrams in dynamics. c) the difference between velocity and acceleration. WHY? because only understanding this difference they can understand what Newton's second law really means. d) What a vector is and how to find its scalar components. WHY? Because applying Newton's law requires understanding scalar components and how to determine whether they are positive or negative.
How do I know what is important? If you are using our textbook (College Physics: Explore and Apply) then on the front page of Chapter 3 you will find the most important things that the students need to learn in chapter 2, and in chapter 4 - the most important things that students need to learn in chapters 2 and 3 and so forth. Do not skip these introductory pages in the textbook. Not only do they provide you the ideas for the Need to KNOW, but they also help you focus on the most important ideas in the previous chapter. I am attaching the screen shot of the first page of Chapter 3 with the red circle to show you how to find the list of the most important things.
What is my students cannot do the activities? Be patient implementing ISLE during kinematics. This is when the students are not used to the method, they worry that if you don't lecture, they will not learn. Thus, make sure that you use TIME FOR TELLING after each activity to summarize what the students should have learned from it but only AFTER they attempt the activity themselves. Do not wait for every group to finish every activity. Send the representatives of the first-finished groups as ambassadors to other groups to help and have sharing sessions for the whole community. Have trust in your students - they are much smarter than we often give them credit for but a lot of prior schooling experiences taught them not to think, so it takes time for them to start thinking. But once they do, they love it and you will be amazed.
Now it is time to welcome our new members! Please scroll down and read my posts for the new members. I made a few this past week as over 40 people joined the group. Most importantly, visit islephysics.net ot learn what groups is about. See your calendar of events for the upcoming free zoom workshops (2 hours on Saturdays). Check the posts daily. Like them or comment to make sure the next post comes into your feed. We are a big loving community and we are happy to have you as our new members!
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nF5ZsW3DznSVwy9xlMOwqvEx8j1dZdOJF-eIgq6MvNCze-Rpo84nHm6mUl8CoOMuB1AYmvK6q&__tn__=%2CO%2CP-R

Syd Clams

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Hi! I'm new to this group. I recently joined because I have been teaching AP Phys 1 for 2 years. I am really looking for something new I can share with my students.
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Patricia Coyle Fletcher

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Curious to “hear” your thoughts on his habits of mind, publications, awards worthiness compared with others of his time.
I haven’t studied this physics topic much yet.
For those who don’t know me yet, I wasn’t raised around people who were capable of sharing their physics habits of mind with me in ways I could "hear".
Several respected “teachers” and “friends” helped make me feel stupid every time I tried to develop comprehension or had original ideas, and I became a deeply entrenched physics-o-phobe.
I came to ISLE and the Etkinist-style approaches when I was teaching NJ grades 7-12 for money and volunteering w/ FIRST robotics as FLL/FTC/FRC mentor/global championships judge for ages 5-death.
I got tired of being afraid of physics, and thought the ISLE/Etkinist crowd could help me overcome.
Your habits of mind via multiple representations will help me to more deeply comprehend the concepts Tsung-Dao Lee spent his life exploring. 🙂
——/—-/——
Passed away earlier this month. Rest easy, Good Sir.
And thank you.
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Frank Noschese

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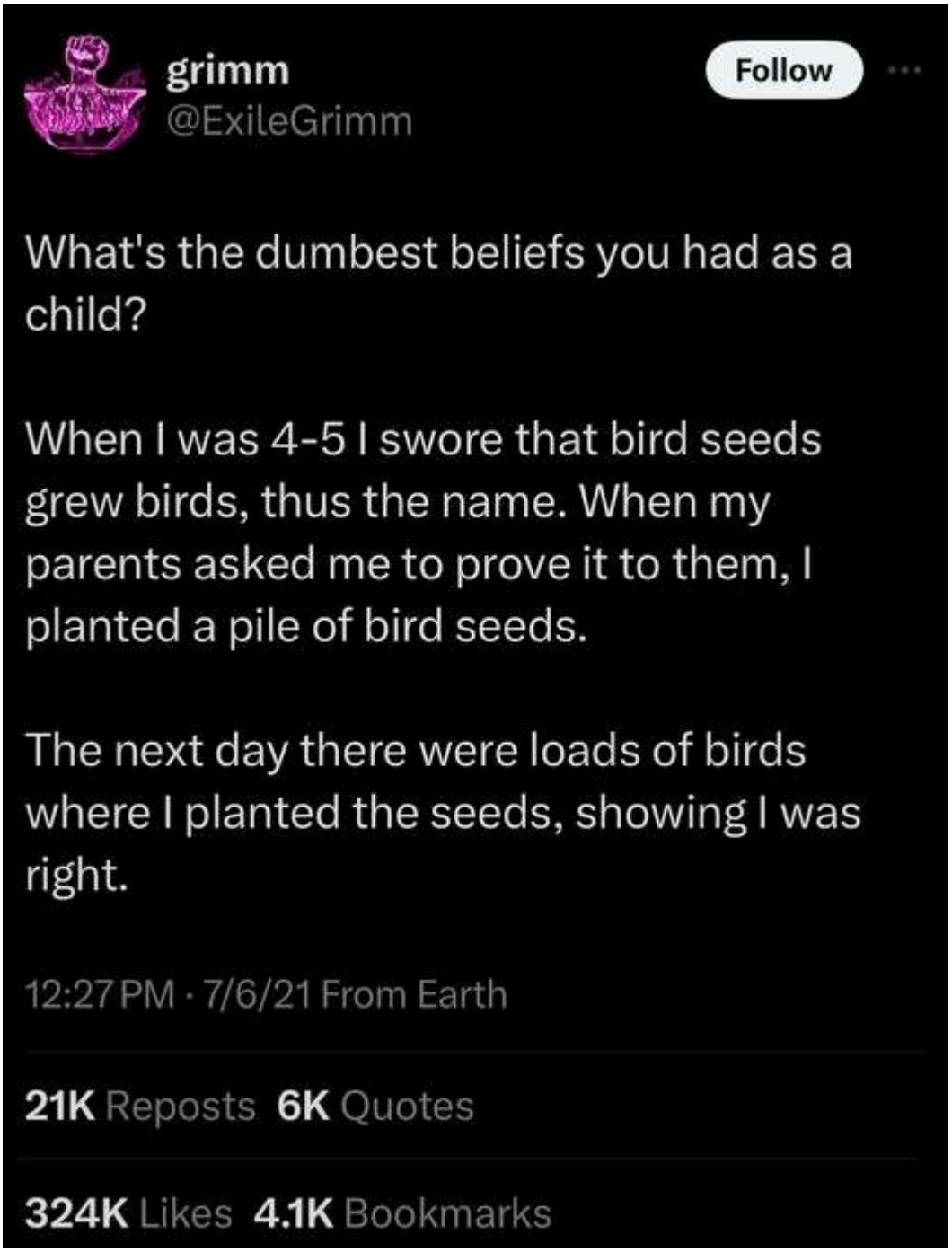
This was making the rounds on social media recently. Great example for talking about testing experiments! Link to original tweet:
https://x.com/exilegrimm/status/1412448161688215553?s=46



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Paul Wolf

Level 1 contributor

I wanted to share 2 updates. One is that with my non-AP physics I am using PUM. I am using a version of gamified grading that lets students choose their assignments. Last year had to make certain assignments required because students seemed to be working only to their strengths and skipping the more rigorous fine points. I have found that requiring them to write the lesson reflections and making sure they answer technical parts like "define a reference frame" has been helpful at least in helping them recall vocabulary and to think about some of the finer points.
The other is that I found a great tip from math teacher Howie Hua who has given me a better way to take questions when I have finished talking to the class.

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Timothy Magill
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My students worked through ALG 2.1-2.2 this past week. Eugenia Etkina, first I wish to say how they and I have been enjoying the work. (Add the fact that beginning this school year cell phones have been disallowed, and their attention is fully on this effort.)
I have 45-minute class periods. I estimated that students could accomplish 2.2.1-2.2.4 in one period, and I assigned one book problem for the evening for them to re-think what they'd done. I figured 2.2.5-2.2.8 would take the next class period, and the reading of 2.2, its review question, and a couple of review/deepening questions from Mastering would again be homework.

My estimating has turned out to be not so good: the students accomplished all the ALG activities as well as my "evening review" activities during the class period, with 5-10 minutes to spare. I'm curious if you have any comments/reactions to this. I will add that the mood in the room was focused and upbeat. Perhaps a few minutes of "brain break" at the end is preferable to "cramming in" another activity or two? Is there perhaps an ALG pacing guide I've overlooked?
(Reposting at the top level for more viewership.)

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Mohamed Gamal

Level 1 contributor
· ·
why is't right to describe doppler effect as the changed in the observed wavelength but instead we say the change of frequency?
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Kristina Pahor

Level 1 contributor
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I wish everyone a nice start of the school year (for countries starting now). May it include as much ISLE as possible😁
My first graders just got their first taste of it.. I always love it when shy girls speak up with excellent ideas, because they are not being asked to guess things they “should know from before”.
☺

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Joe Potillor Jr

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I'd like to send some praise to my kids today (and ISLE). We did lesson 3.1 from the book in class and they understood forces better than students in the past with the double subscripts. 🙂. Thank you Eugenia Etkina for your insights on this topic 🙂 . For context this is an honors physics class, not an AP Physics class. It was beautiful to watch my students insights be the correct ones without prompting from
me.
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Hrvoje Miloloža

Level 1 contributor

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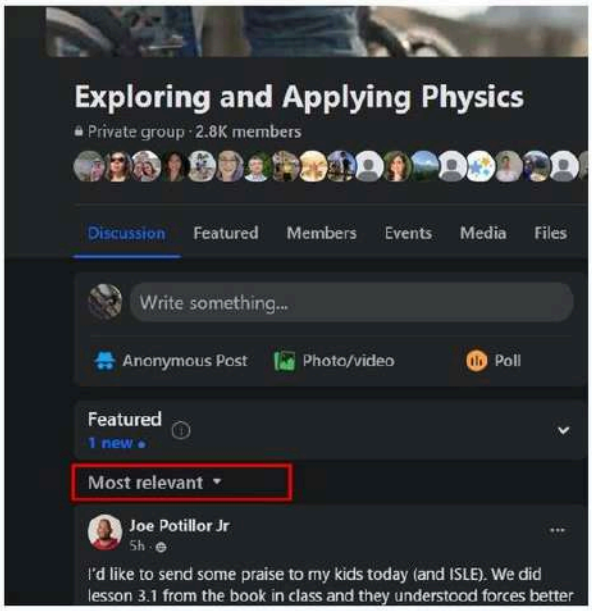
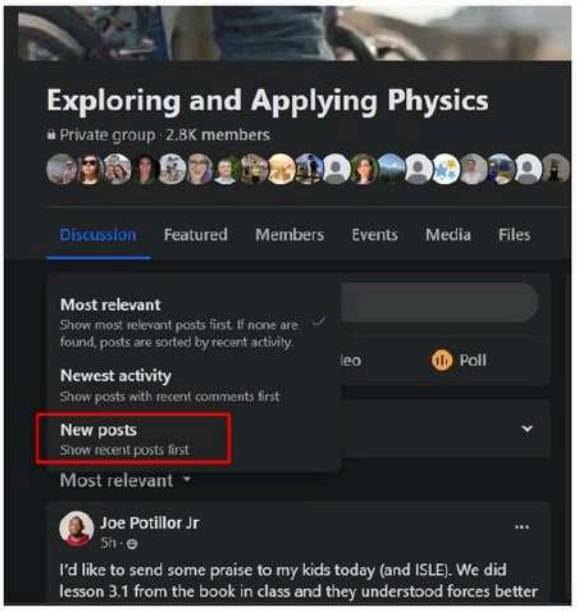
Third option is best for staying up to date but first option is always the default one.
Comment if this helps solve the issue.





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Rob Mason

Food for thought. It was shared in the PrettyGoodPhysics email group. I like the idea. Hope it gains traction!
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Jason Chung

Level 1 contributor

.

I have a question: how to determine the number of significant figures? For example 6500 is 6.5*10^(3). Do they have the same number of significant figures?

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Frank Noschese
September 6

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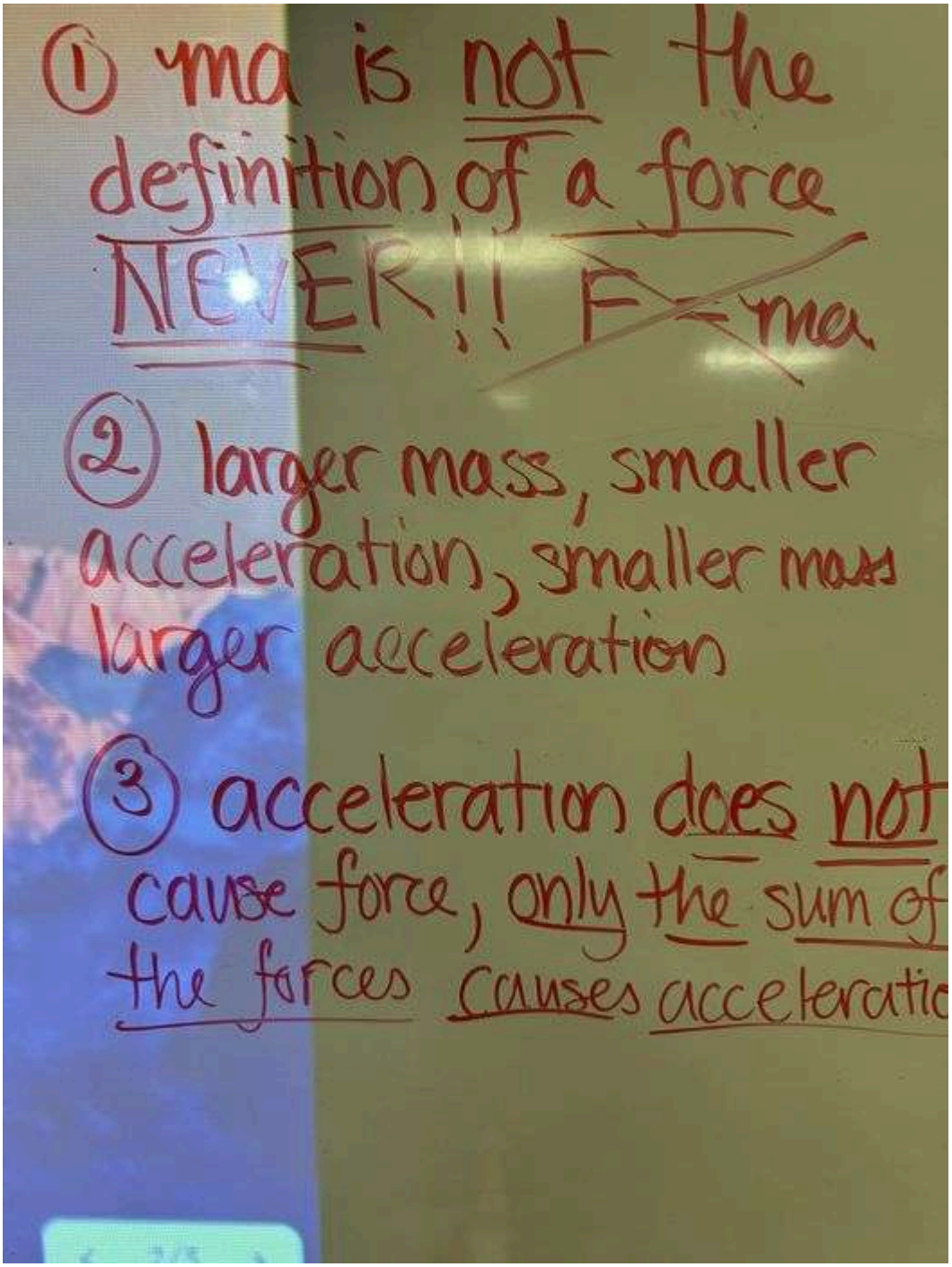
I'm looking for a description of the prompts from the Expertise Activity by Lin and Brookes. I think I've seen them before -- tucked away inside some other research paper. I recall prompts like this: "Describe a time when you didn't accomplish your goals. How did you feel? What did you do next? Do you still make mistakes as an expert? How do you know you've made one? What do you do next?"
I've spent way too much time searching the internet. Perhaps someone here can link to the document?
Thanks!
https://www.facebook.com/groups/320431092109343/posts/1697039284448510/?__cft__[0]=AZV1L2TPtluSNjfriCibZf5BNVPqgXu-XsMgBqrju6eE1rqRb_nIG0bkq-uViS027DCRVMKZa3q4veAlnyLlLa5aU-D7cr_uKCjIqHFeV8XqZV1PpePJEYaT6Demd9usZZ84WgvXdc61jtkt0jP5RLSqb8-r7fnfgJUSwrvZ40009nCsLG_iu-HyGIMumUh5zsA&__tn__=%2CO%2CP-R

Joe Potillor Jr
September 7

.

Yesterday in class we did Newtons 2nd law (lesson 3.5).....I think they understood, written in red for emphasis 😛. This has been drilled into me since high school…I got yelled at once for using the forbidden equation 😛. I'm hoping I can convince the district to switch to this book next year. The kids are getting it so far.



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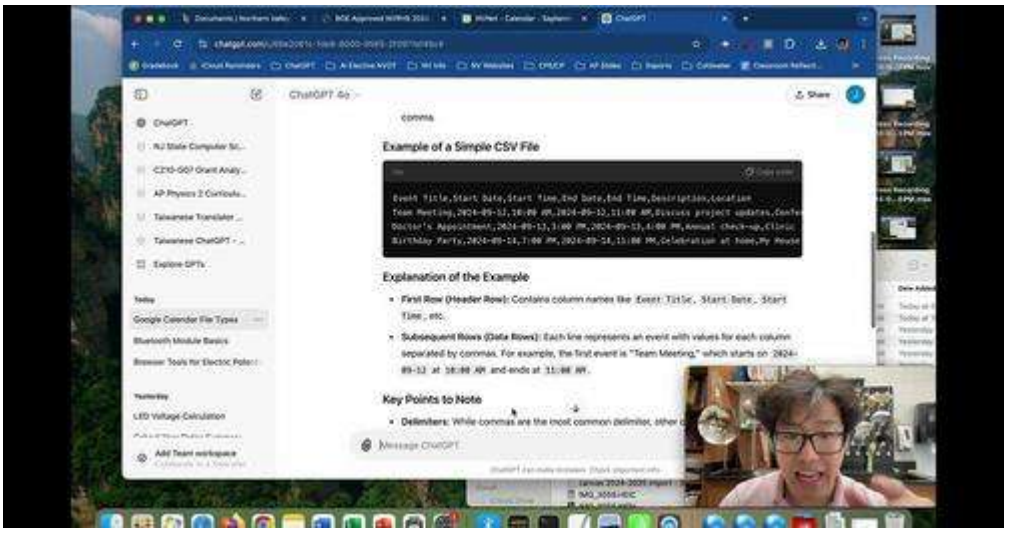
Jeffrey Lai
September 13
.

I created this for my colleagues but this is a quick way to update your Google calendar from department notes if anyone needs it.



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Timothy Magill
September 15

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(I'm new this year to ISLE...) I've had my students complete reflections three times now this year, using roughly the four questions from Eugenia Etkina.This first two I had them type into a Google form. I now believe that is a mistake, at least until they are used to ISLE and the reflection process, because they seemed to think the reason was to tell me things. (Including complaints, e.g., "I don't like this teaching style" and so on.) Very few seemed to grasp the intention of any of the questions.
Therefore for our third set, I asked them to answer the questions in the notebook I supplied each of them. I encouraged them to use words, diagrams, equations, whatever helps -- to borrow a useful phrase from one of our group colleagues, Stephanie Hunt -- their "future forgetful selves" remember the important points. I plan to look tomorrow for its existence, but not to read (many of) them. I'm hopeful that this way the usefulness of the process will be more obvious to them.
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Kristina Pahor
September 16

.

Hello everyone... I just wanted to share some results analysis to encourage everyone that might be in doubt if ISLE is effective in the preparations of students for standardized exams like the International GCSEs.
I was happy to see how my students performed, specially in the topic of energy that I taught with help of consistent use of bar charts and practice in universeandmore.com.
Consistency in definitions and terminology payed off!
Here below just a quantitative justification of my claims - more than 20,000 students all over the world are doing these exams (after Y11) and the last column shows to what extent students responded above average.
Hope this will be helpful to anyone 🙂

Topic 4: Energy resources and energy transfers	23.89/32	75%	20.34/32	+11.09%
Units	-	-	-	-
Energy transfers	11.11/14	79%	9.10/14	+14.36%
Work and power	7.44/8	93%	6.52/8	+11.50%
Energy resources and electricity generation	5.33/10	53%	4.72/10	+6.10%

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Anne L. Caraley
September 17

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Hi. My Unversity Physics II students and I just had a great time doing this Equation Jeopardy activity. But we were stumped by part (d). Perhaps we took the phrasing "one change" too literally. Would we not need to change, for example... in the most simple way, the amount of one of the other charges AND the sign of that other charge?

17.6.3 Equation Jeopardy

Class: *Equipment per group:* whiteboard and markers.

The application of Newton's second law for a positively charged object at one instant of time is shown in the equation that follows. Other charged objects are along a horizontal line. Work with your group members on the activities that follow. Present the results to the class.

$$(4.0\text{ g})a_x = \left(9.0\times10^9\text{ N}\cdot\text{m}^2/\text{C}^2\right)\left[-\frac{(200.0\times10^{-9}\text{ C})(30.0\times10^{-9}\text{ C})}{(0.2\text{ m})^2}-\frac{(900.0\times10^{-9}\text{ C})(30.0\times10^{-9}\text{ C})}{(0.3\text{ m})^2}\right]$$

a. Draw a force diagram for the object at the instant the equation applies.

b. Sketch a situation the equation might describe at that particular instant.

c. Write in words a problem for which the equation is a solution (it applies at only one instant in time).

d. Determine one change that could be made in the situation so that the net force exerted on the object of interest is zero.

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Christina De Bianchi
September 18

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Hi all! I hope the school year is treating everyone kindly! Is there a recommended selection of problems in each chapter? I am not referencing the nontraditional end-of-chapter questions and problems.

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Katerina Visnjic
September 25 at 5:27 PM

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Hi all, I created a video explaining how to interpret negative energy, and more generally how negative signs have different interpretations when in front of vectors vs. scalars.
Feel free to use in your class if you think it might be helpful for your students!

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Roby Rod
Top contributor
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September 29 at 8:12 AM
.

Hi everyone, I have moved to a new school and took my ISLE teaching there. It was in general really well received and I got some very positive feedback all round. However, the other day two students (two lovely hardworking girls, one very high achieving) came to see me to say that they are really struggling with the lessons: too noisy, too much discussion, they are getting too over stimulated, and in general things are too chaotic. I am not too sure how to address this, and it did made me reflect on how perhaps the ISLE approach does not suit everyone, particularly some neurodivergent students. I can certainly improve in terms of clarity of purpose for each activity, and make the structure of the lessons more obvious, but I am not sure what to do about the noisy classroom and overstimulation. How do we include everyone in the ISLE approach, including students who do need a quieter environment and a more prescriptive approach?
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Timothy Magill
September 29 at 9:55 PM
.

A few days ago we worked through ALG 3.5.1. As students examined the data for the changing-mass experiment (exp #2), I tried to avoid/delay telling them the relationship a ~ 1/m, instead inviting proposals. One group suggested that a squared ~ 1/m. When one plots a^2 vs 1/m, it is not obvious that it is an inferior fit as compared to a ~ 1/m. Other than to say -- at that moment -- that "it turns out that a ~ 1/m IS a better fit", how might I have approached this?
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Kayla Anne
September 30 at 7:25 PM
·

Hello! 👋🏻
Background: I am back to teaching high school after a three year maternity leave and in a brand new district. I have two groups of students (junior or senior) and I see each one every other week. They are only two levels of physics here - AP or general and I teach only general. My courses contain students of mixed ability, I have students who are struggling to calculate the mean of a data set and as well as those in Pre-Calc in the same room at the same time. I am also the only one who teaches general physics at my school. I had only just begun create an ISLE classroom… then covid hit, and I had a baby.
I'm struggling with a few things and I'm hoping this fabulous group can help me!
1. How do I meet the needs of all learners in a group this diverse? What strategies do you use that don't require a lot of prep? (I have over 160 students, I also teach an Environmental class I've never taught before and still need to grade things 🫠!)
2. I've looked at the resources and files. I don't have a teachers edition of the textbook, but my school does have both the ALG and College Physics books. I'm looking for some sort of time line to give me an idea of how long things should take. Im used to having to teach the full MA curriculum framework for an MCAS test and don't have to anymore so I'm LOST on my timeline. Does a timeline/pacing guide exist somewhere and I'm missing it? If it doesn't, but someone has one they would be willing to share so I don't have to start totally from scratch that would be exceedingly helpful!
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Timothy Magill
October 1 ·

I am new to ISLE, and ISLE is new to my school. I believe I'm mostly following the ISLE processes: we work from the ALG, focusing at least on the pivotal activities; I often assign a question or two for the evening that revisit the concept of that day; we discuss these questions and/or the text section review questions at the start of class most days; and I try to pull student ideas, rather than wording things as if I'm the only/primary authority. (I say "mostly following" because I don't think I'm a pro at this yet, but I'm working at it, every day.)

In hindsight, I think chapter 2 went by with me not doing enough "time to tell" on each day's activities, but I'm careful now to pull things together, usually at both the end and on the next day, the start.
Here's my concern: many students are convinced, or claim to be, that I'm not teaching, or that I'm unhelpful, that they're on their own, etc. A small revolt seems to be building, with some parents and students contacting counselors or principals. (I don't know what proportion "some" is.)
In addition to my explanation of the course in the early days of the year, I sent a message about one month ago to students & parents alike explaining the ISLE concept. I quoted sections of the introduction to the text.
One parent emailed me tonight to the tune of, "our son needs a solid foundation in physics for college, and we don't think he's getting it" -- and this son is one who, when I talk with his group, seems to put up blocks rather than try to answer my helping questions.
I find myself wondering, "am I actually doing what I ought to be doing?"
I'd love some guidance. Hopefully I've included enough detail here that ISLE experts in the group can help me!

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Gorazd Planinsic
October 1 ·
Today I am posting an ISLE-style assignment as a follow-up to the Electromagnetic Induction workshop that Eugenia did on Saturday. I look forward to your solutions and comments.
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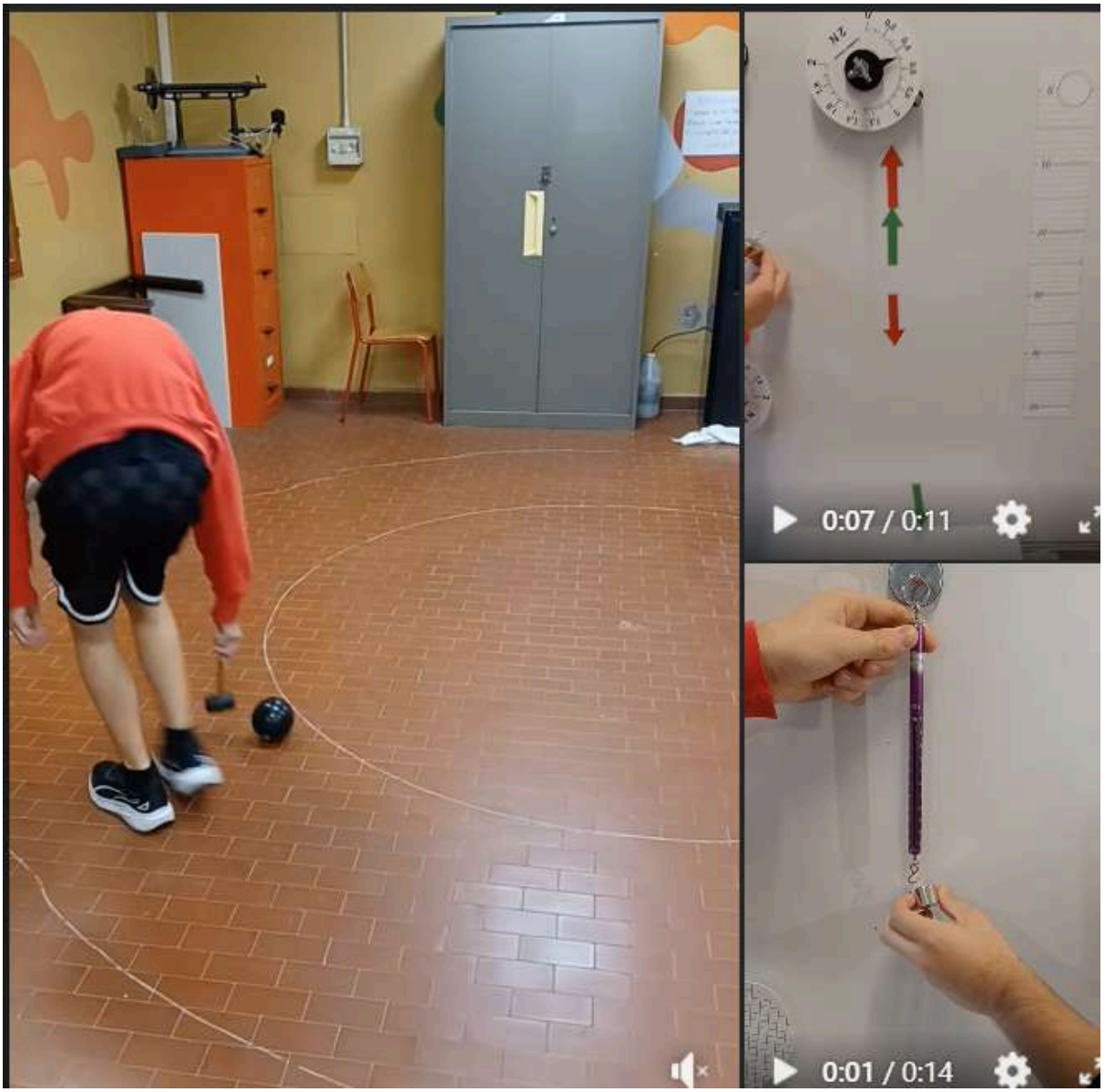
Franco Rizzoli
October 3 ·
Uniform circular motion in a school in Bologna,Italy.



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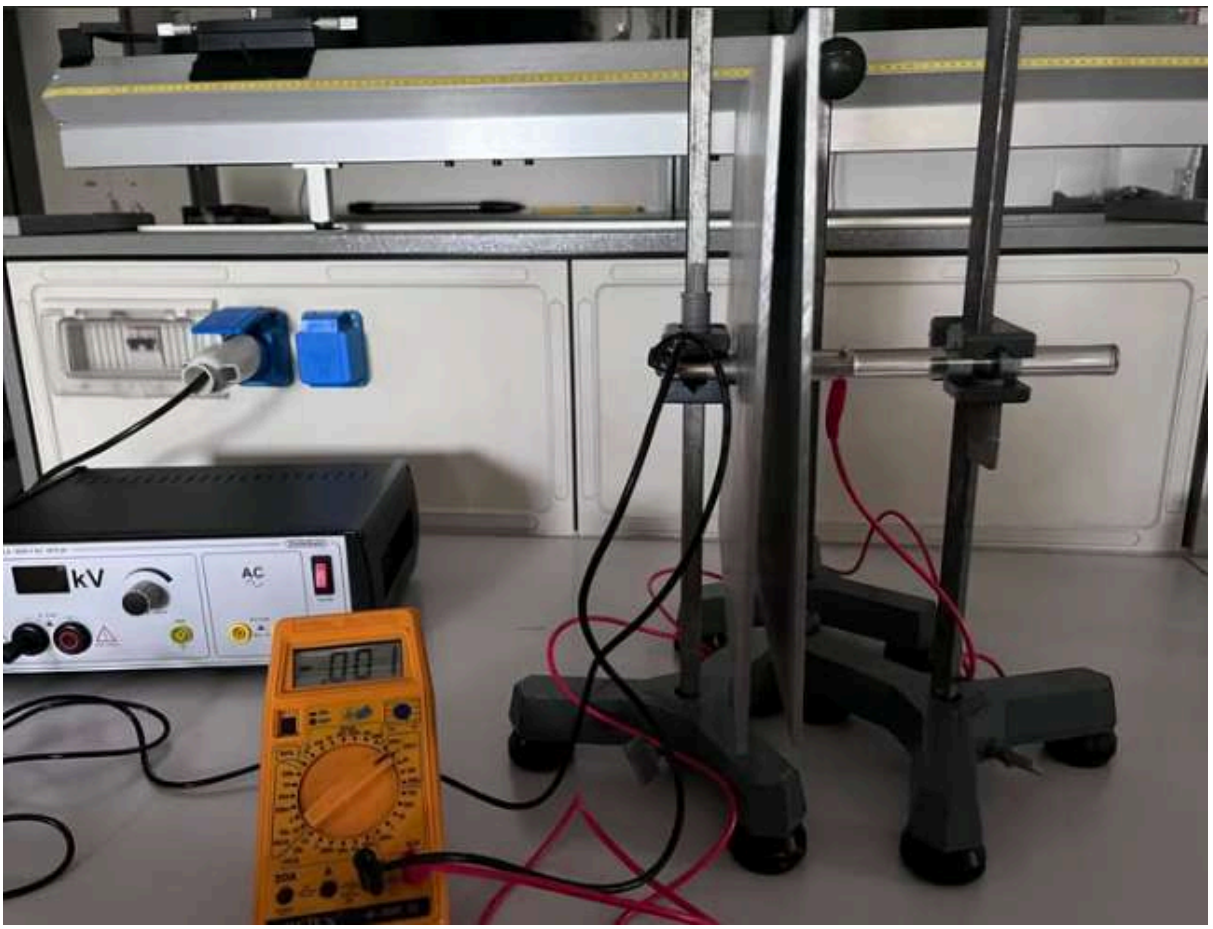
Roby Rod

Rising contributor
· October 3 ·
Hi everyone, I am trying to recreate this experiment https://mediaplayer.pearsoncmg.com/.../sci-OALG-18-4-3 but I cannot manage to. Here is my setup. Maybe the plates are too big/thick. I am earthing the left plate through the black cable but the voltmeter's reading drops really quickly. Thank you for your help!



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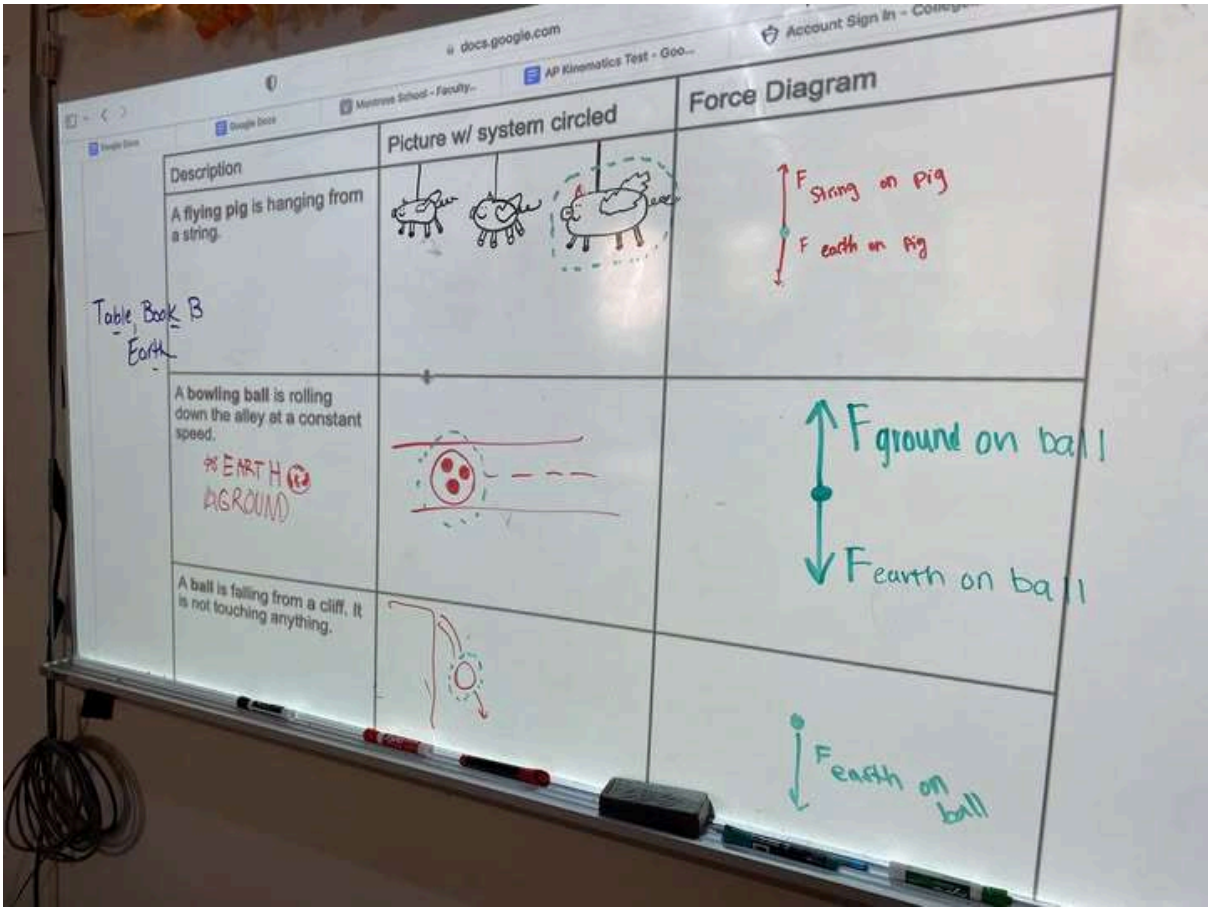
Allison Daubert

Rising contributor
· October 4 ·
First day of introducing forces and having students draw force diagrams. Not a single student even attempted a “force of motion” or “force of the throw” because of our class rules on naming forces! Check out these awesome day-one force diagrams and pictures from my CP physics girls!



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Glen Jammin
October 4 ·
Hello Eugenia and Community, I have a question for Eugenia Etkina and others who aren't in their first year of ISLE. The new AP Physics syllabus places CofM in unit 2. When is this covered in ISLE? Why do you do it that way? I know most people address it in momentum and/or rotation but curious where it comes up for us ISLE folks and if there is a reason you are covering it there. Thanks!

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Franco Rizzoli
October 4 ·
Speaking of Towers: this is the Asinelli tower in Bologna. Giovanni Battista Guglielmini in

1791 was the first experimenter
who attempted precision measurements on the
deviations to the east and south of
an object free falling from a
tower.
● In the Torre degli Asinelli, doing
drop balls from a height of 78
meters, after a year of experiments
the scientist collected his results
obtaining an average deviation of
1.77 cm towards the east and 1.12 cm towards
south.
(You can use the photo)

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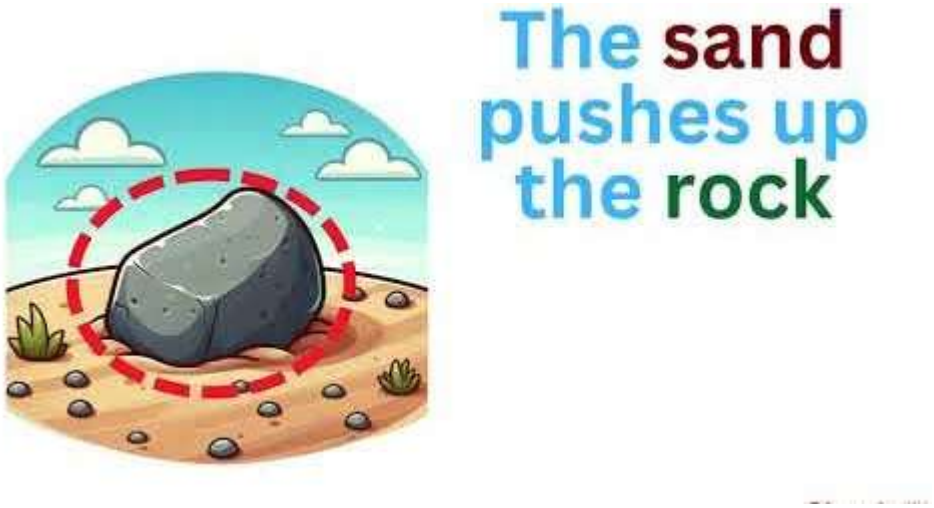
Luis Largo
October 4 ·
I want to share this based on Allison Daubert's last post.
The steps are from the book, and I will be sharing this with my students.
#ForceDiagrams



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Jason Chung
October 7 ·
I have a question: can Newton's laws still hold at very high speed or very low speed?

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Lynn Eckert
October 9 ·
I'm losing my mind with one group of students. It may be my fault? They cannot explain the relationship between velocity and acceleration of a cart that is speeding up or slowing down on an inclined track. Regardless of what the lab quest graph shows they seem stuck. I lectured. I diagrammed 8 different graphs Ann's explained them and I assigned a video and a section in the physics classroom. I asked them the signs of the velocity and acceleration. - going up the track and then down. They are probably still arguing. I wave the white flag 😢

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Amin Rainy

Rising contributor
· October 13 ·
Thanks, Eugenia Etkinafor a wonderful Zoom meeting today. I learned she uses a specific test designing policy in her class. She asks students in the group to select three questions from the textbook, then solve them and send them to the instructor. Then she selects some parts of the questions from the students' selections. Eugenia Etkina, would you please explain more about it? Also, if anyone here uses a similar policy would please share your experience specifically challenges.
Thanks in advance.
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Andrew Beane
October 16 ·
I was looking for some advice/feedback. I am teaching a calculus based physics for first time with only 4 students at a local university and the course is 8 weeks long. I was wondering if the ISLE approach would work in this setting and if anyone has done anything similar. I am applying it to AP course currently but not sure how it translates to a Calc based college course.
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Timothy Magill
October 18 ·
We've begun looking at friction, by doing ALG 4.3.x. On the plus side, many students arrived at the idea of testing changing: 1) the materials, 2) the quantity of surface area shared between the sliding surfaces, and 3) the force with which the sliding object is pressed against the other. On the other hand, many observed (or believed they had) that the friction force varies with shared surface area, which we know is broadly not true.
I do not want to tell them, but would like them to discover for themselves the correct conclusion. Do you have suggestions as to additional experiments we could conduct to clear up this misunderstanding?
My current thought is to follow ALG 4.3.3 (in which data is plotted and the slope is found to be the coefficient of static friction) with another experiment. I propose to have them vary the added mass atop a friction block. They will orient the block on its side of largest surface area (felt side down) for one data set, then repeat with the block oriented along a narrow side (felt side down). In fact, we probably ought to perform two additional runs on the next two sides, with the naked wood down. I'm thinking that the slope result may be clearer and more convincing. However, I've not done this before. Any suggestions, anyone?
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Timothy Magill
October 20 ·
I have a pedagogical question regarding ALG 4.4.x -- As I'm understanding the approach taken in this text (which I'm appreciating, BTW), we'll only draw a single arrow per object interacting with our system. As I understand it, this has us draw one diagonal arrow for a supporting surface that has friction, rather than separate arrows for friction & normal. In this way we see friction & normal merely as components of the single interaction. With that background, I'm puzzled by the examples given to the students in 4.4.2 and 4.4.3, for example, and the solutions offered in the ALG-SM for 4.4.1. In each of these cases it seems to me that separate arrows are being shown for friction and normal. Am I misreading, or perhaps am I misunderstanding the pedagogical plan here?

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Jessica Hanzlik

October 23 ·
I am using the PUM curriculum with a non-AP HS physics class. We will wrap up Dynamics next week. Is it better to do the Momentum unit or the Energy unit next? Thanks!

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Kayla Anne
October 24 ·
Ate there any plans of a new edition of the textbook in the next two years? I'm looking to order for my school and want to make sure I make the best decision 🤣 Eugenia Etkina
https://www.facebook.com/groups/320431092109343/posts/1733176660834772/?__cft__[0]=AZW35QGXE-0RO_Bqap-je3W_7uvtWh_S6KJTfolGW6pYok_qGeTm_x7YtNgZz1r0Vs_umZZHdvZRrCE95EZ7NA4nRkvClPmAs-GND1VMR-pwbjBTB80zw_ZQkEePzZ9Ed1cRm5M3YFhvlcAJyyijYg9ugVflc1abqPG-grzUZIuBheDtT5EjoYQvLz_gkrlkPTo&__tn__=%2CO%2CP-R

Marianna Anthea Bannon
October 26 ·
I've used The Expert Game in my classes ever since attending my first workshop in 2018. Over the years this experience has grown and morphed as I've desired to try to engrain the learning process with my students. (The cool part is that I have lots of students say, "I am so prepared for college thanks to your class!) By accident I've run into a cool opportunity reading student reflections after their first reassessment and before the next one.
https://physicsteachermomma.com/.../student-reflections.../

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Anne L. Caraley
October 27 ·
Hi Eugenia Etkina,
I feel silly but I cannot seem to find access to posted FB / Google Drive resources while at my laptop. I missed the workshop on Magnetism because of a last-minute scheduling conflict. I would like to access any "FINAL" OALG for Chapter 20 and other workshop materials that I missed, including the video. Thanks.
I do have the materials I downloaded as zip files directly from Pearson. A year or more ago, so I think the OALG is out of date?
Update: I got the shared main ISLE link of Hrvoje's off my iPad and have found my way to the posted presentation slides and the Zoom video.
Still wondering if there is a FINAL version of the OALG.
And where, in general, one finds them. I downloaded lots of stuff a few years ago now but may have lost it all in a computer failure.

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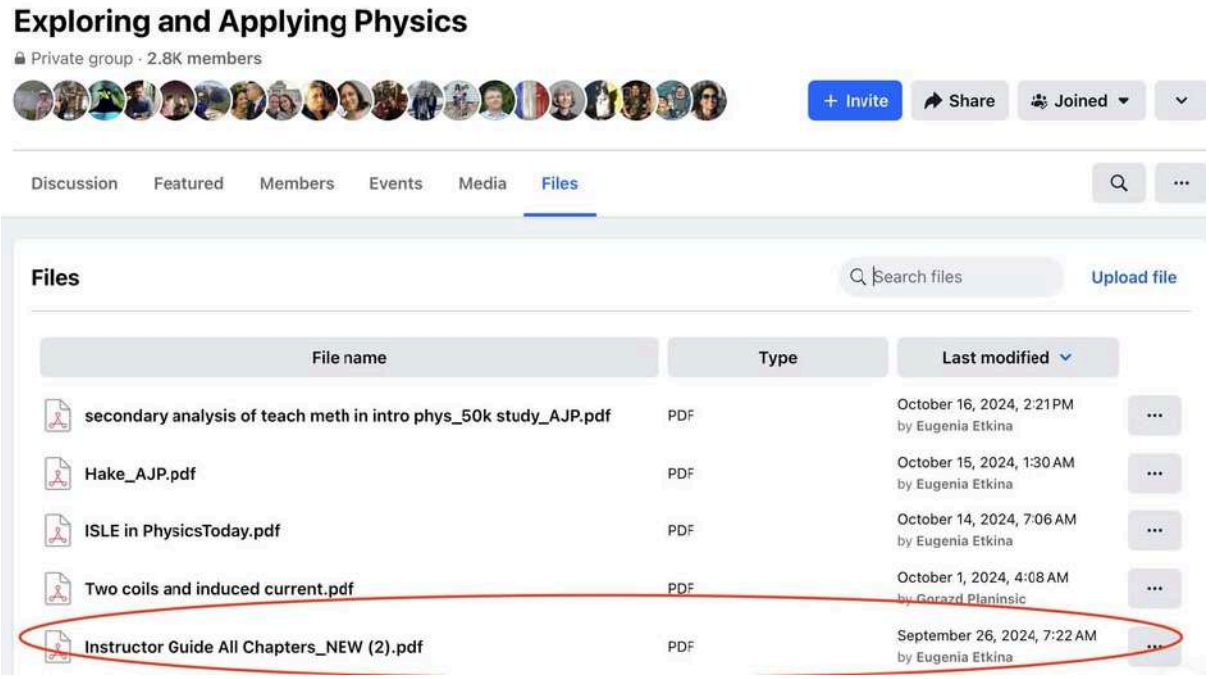
Jeffrey Lai
October 28 ·
Hi, just posting this and perhaps there's a way to pin this comment. This is how you can find the Instructor's Guide that Eugenia is referring to. It was an amazing help for me in diagnosing my own practice and I realize that half the time, if I have a question, it's likely already answered somewhere in the IG if it's about my own practice or in the textbook if it's about content so I thought to post this to help out.



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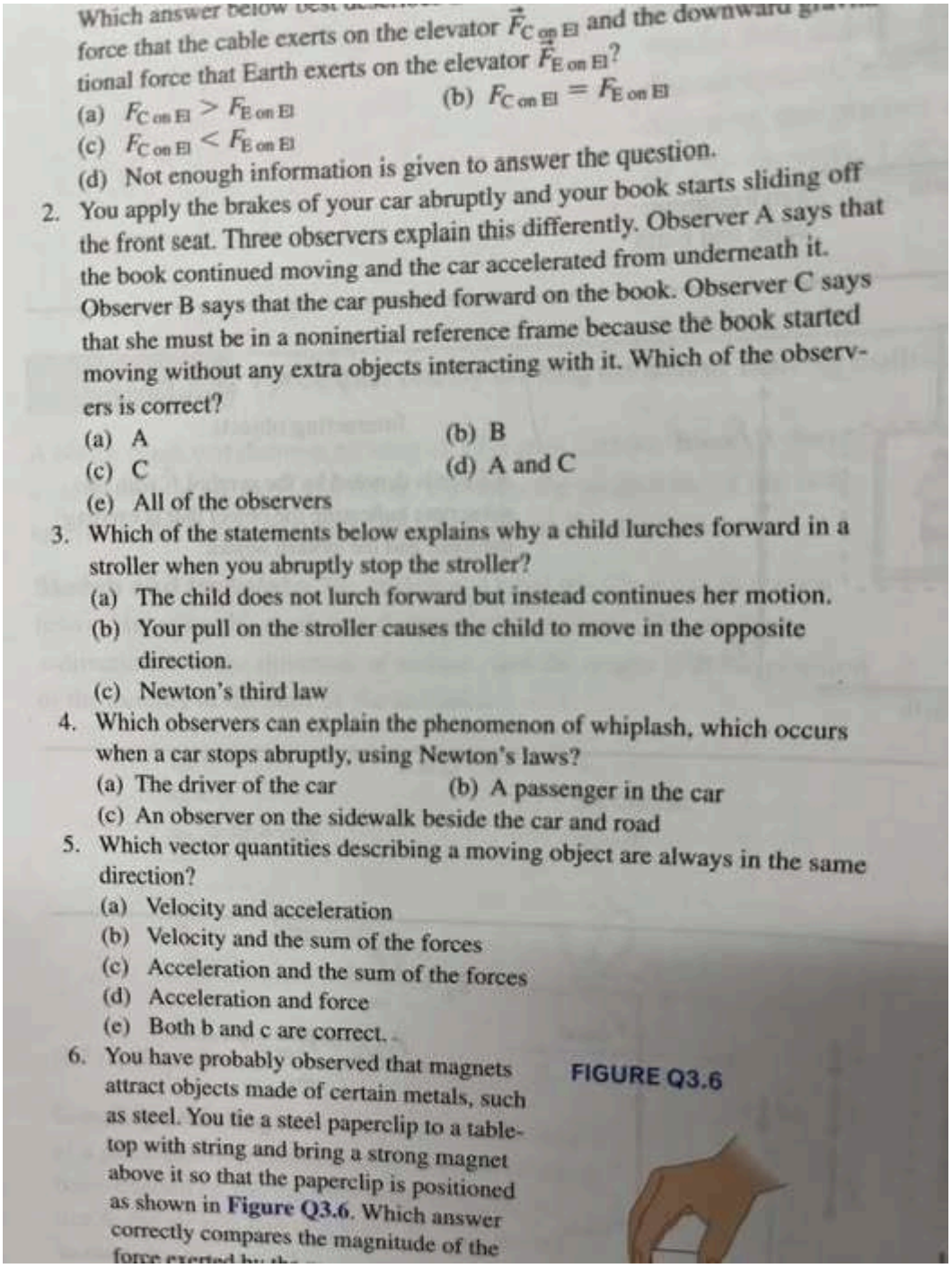
Christina Friddle
October 31 ·
Would someone be able to explain why the answer is only (a).. my students say the correct answer is (d). They also had a lot of trouble with number 3 and 4.
Thanks for any help.



Which answer below best describes the force that the cable exerts on the elevator $\vec{F}_{C \text{ on } El}$ and the downward gravitational force that Earth exerts on the elevator $\vec{F}_{E \text{ on } El}$?

(a) $F_{C \text{ on } El} > F_{E \text{ on } El}$
(b) $F_{C \text{ on } El} = F_{E \text{ on } El}$
(c) $F_{C \text{ on } El} < F_{E \text{ on } El}$
(d) Not enough information is given to answer the question.

2. You apply the brakes of your car abruptly and your book starts sliding off the front seat. Three observers explain this differently. Observer A says that the book continued moving and the car accelerated from underneath it. Observer B says that the car pushed forward on the book. Observer C says that she must be in a noninertial reference frame because the book started moving without any extra objects interacting with it. Which of the observers is correct?
(a) A
(b) B
(c) C
(d) A and C
(e) All of the observers

3. Which of the statements below explains why a child lurches forward in a stroller when you abruptly stop the stroller?
(a) The child does not lurch forward but instead continues her motion.
(b) Your pull on the stroller causes the child to move in the opposite direction.
(c) Newton's third law

4. Which observers can explain the phenomenon of whiplash, which occurs when a car stops abruptly, using Newton's laws?
(a) The driver of the car
(b) A passenger in the car
(c) An observer on the sidewalk beside the car and road

5. Which vector quantities describing a moving object are always in the same direction?
(a) Velocity and acceleration
(b) Velocity and the sum of the forces
(c) Acceleration and the sum of the forces
(d) Acceleration and force
(e) Both b and c are correct.

6. You have probably observed that magnets attract objects made of certain metals, such as steel. You tie a steel paperclip to a tabletop with string and bring a strong magnet above it so that the paperclip is positioned as shown in **Figure Q3.6**. Which answer correctly compares the magnitude of the force exerted by the

FIGURE Q3.6

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Joe Potillor Jr
November 2 ·
I'd like to share another teaching win today. In my class we have started energy. As a class we did observational experiments 7.1 and 7.2. The kids sucesssfully were able to take note

of the various observations in the analysis (which I did not give them). They were also able to derive the relationship with force, displacement and work. I also extended these observational experiments to see if they could derive from this experience the various formulas for gravitational potential, elastic potential and kinetic energies, they did so successfully. So proud of my students. Don't be afraid to back away and let them do the work…it's so hard (even for me still sometimes). Thank you Eugenia Etkina and Tatyana Makarova for being influences on my teaching. Monday they'll be starting energy bar charts and conservation of energy 🙂.
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Tom Prewitt

Rising contributor
· November 2 ·
Since we are sharing experiences, I wanted to share mine from Friday. I learned from my kids. I was having them do a test experiment to see if constant velocity linear motion (I wish there was a name that fit more comfortably into a high school student's existing vocabulary) explained the motion of a falling tennis ball. Using the app, 'Seconds Count,' they measured how long it takes the ball to fall 2 meters and used that to predict how long it'd take to fall the 8.6 meters it's possible to obtain by dropping it off our stadium. I had worked the math out beautifully (in my mind) going from sketch to dot diagram to graph to equation. I guided them in class. I showed how to use the velocity we measured to create dots every 0.2 seconds - that made sense to me. It didn't to the kids. Instead one of the more articulate kids explained to me (in so many words - I had to listen carefully), that it made more sense to imagine a sugar pack at the point of releasing the tennis ball and then when it hit the floor in our classroom (at 2.0 meters). Probably because it's hard to see exactly when a dropped ball starts moving, we had measured that the time of hitting the floor was close enough to .667 that we could use 2/3 seconds. The student explained the next sugar packet would be at 4.0 meters and it's time would be 2/3 s + 2/3 s = 4/3 s, and there'd be one at 6.0 meters and it's time would be 6/3 s. There'd be one at 8 meters, 8/3 s and one at 10 meters at 10/3 s. So, using CVLM we'd predict the ball dropped off the stadium would hit the ground between 8/3 s (2.67 seconds) and 10/3 s (3.33 seconds). The ball lands somewhere around 1.3-1.4 seconds. At that point I ask the kids, what went wrong. They search for arithmatic errors, measuring errors. I have to guide them to, "Maybe CVLM does not explain the motion of a falling ball. Maybe we need something else."
I was super happy that this result was so clear. I know most of them will not have tracked. That's okay, in the past I am used to no one tracking and having to deal with the idea that a ball falls with constant velocity all year long.
What I'm trying to highlight here is how one of my students came up with a way of diagraming the falling ball based on two points we know and avoiding translating it to speed and artificially creating dots (virtual sugar packets) at regular time points.

My goal is to help students construct better understandings. One of the hardest things for me to do is avoid throwing in a block that I have, that they don't and that interferes with them constructing understanding in simple steps using what they have.
This is way longer than I intended. If you read to here, thank you for being patient with me. The beauty is my students are getting to that point, also - being patient with me as together we attempt to construct their understanding of physics.
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Dennis Cazar Ramirez
November 4 ·
Hi there!
Did anyone tried bansho teaching methods in physics?

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Amin Rainy

Rising contributor
· November 6 ·
Dear all,
I am teaching in Georgia State University and use ISLE in my Algebra-Based Physics in the studio class.
I have limited time until the end of the semester and should decide to teach Impulse and Linear Momentum or Work and Energy.

The majority of the population of my class are Biology, Pre-Med and Neuro Science.
Any idea is appreciated.
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Nejc Davidović
November 7 ·
I feel I am missing something. Is the left sketch in the book correct (I have older version)? What I am wondering is how do we know where on the line does the image form? For instance another option would be that we see the coin directly above it but the bottom of the fountain also looks shallower. If i draw more rays the second hypothesis is more likely. If I do the experiment it looks like I can position the coin anywhere on that line and it looks the same.
Please help 😅

Table 21.7 Refractive indexes of yellow light in various substances

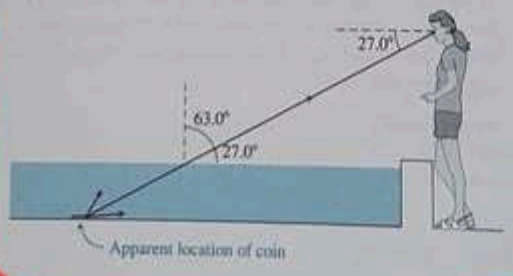
Material	Refractive index n
Vacuum	1.00000
Air	1.00029
Carbon dioxide	1.00045
Water (20°C)	1.333
Ethyl alcohol	1.362
Glucose solution (25%)	1.372
Glucose solution (50%)	1.420
Glucose solution (75%)	1.477
Glass	1.517–1.647
Fluorite	1.434
Diamond	2.417

At the beginning of this section we discussed the difficulty in touching an object under water with a stick. Refraction helps us understand why. See the following example.

EXAMPLE 21.6 Retrieving a coin in a fountain

Light from a coin at the bottom of a fountain reaches your eye at an angle of 27.0° below the horizontal. At what angle should you look to see the coin?

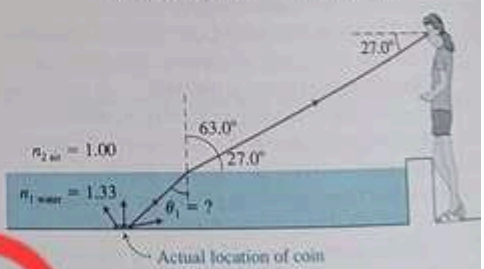
Sketch and translate We sketch the situation and label the known quantities and the unknowns, as shown below. You see the coin because sunlight reflecting from it enters your eye. The light traveling in the air after leaving the water makes an angle of 27.0° relative to the horizontal (making the refraction angle $\theta_{2\,\text{air}} = 63.0°$). The coin *appears* to be somewhere on this line. However, you know that light rays bend when they pass from water into air. Thus we need to find the angle through [illegible] ray travels in water [illegible]mine the direction of the ray in water. [illegible] dexes of refraction of air and water are $n_{1\,\text{water}} = 1.33$ and $n_{2\,\text{air}} = 1.00$, respectively.



[illegible]olify and diagram Assume that just one ray [illegible]sents the light from the coin to your eye, as shown below. It changes direction when it goes from the water to the air.

Represent mathematically We want to determine the incident angle of the light ray [illegible] water-air interface so that after refraction, the ray moves toward your eyes at a 27.0° angle below the horizontal (a 63.0° angle relative to the normal line). We use Snell's law to find the incident angle between the light ray moving in the water and the normal line:

$$n_{1\,\text{water}} \sin\theta_{1\,\text{water}} = n_{2\,\text{air}} \sin\theta_{2\,\text{air}}$$



Sol[illegible] and evaluate Dividing both sides of the equation by $n_{1\,\text{water}}$ and inserting the appropriate quantities we h[illegible]e

$$\sin\theta_{1\,\text{water}} = \frac{n_{2\,\text{air}} \sin\theta_{2\,\text{air}}}{n_{1\,\text{water}}} = \frac{1.00 \sin 63.0°}{1.33} = 0.67$$

Sin[illegible] $\sin 42.1° = 0.670$, the light ray in the water ma[illegible] a 4[illegible]1° incident angle relative to the normal line at [illegible] wa[illegible]r-air interface. The particular ray that makes [illegible] [illegible]ur eye is shown above.

Try it yourself: Suppose you shine a laser light into water at an incident angle of 42° relative to the horizontal. Determine the angle of the light in the water relative to the normal line.

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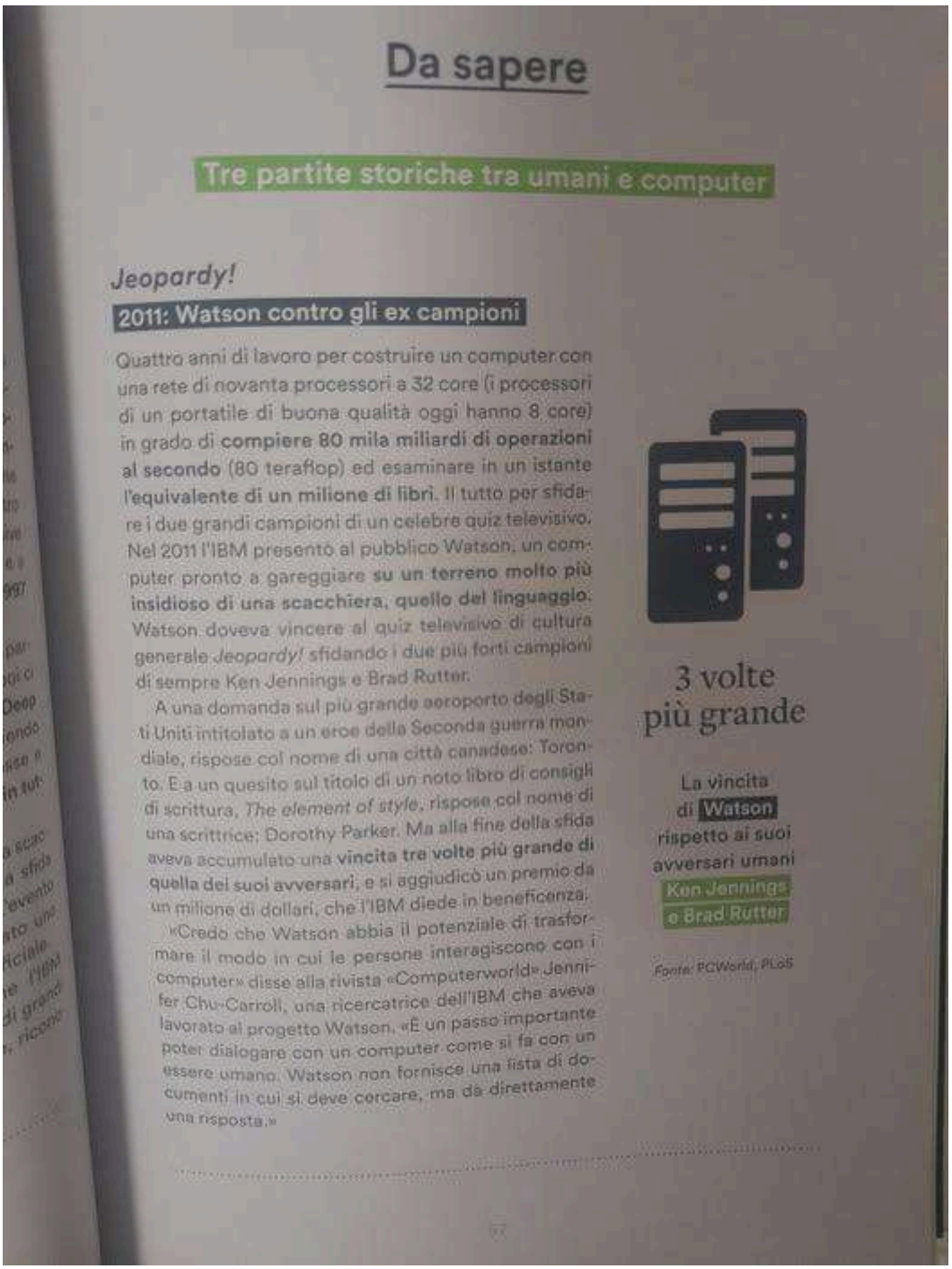
Eugenio Tufino

Rising contributor
· November 13 at 6:45 PM ·

When I first started studying ISLE, I was curious about the term "Jeopardy" for the type of exercise and found out it actually refers, as you know, to a popular TV quiz show in the USA. Today, while flipping through a book of articles on AI, I came across a page mentioning that in 2011, IBM's AI system, called Watson, an ancestor of ChatGPT!, even if it wasn't an LLM, defeated two human champions on Jeopardy. I attach the page in Italian and a link to IBM's page for more info!
https://www.ibm.com/history/watson-jeopardy



Da sapere

Tre partite storiche tra umani e computer

Jeopardy!

2011: Watson contro gli ex campioni

Quattro anni di lavoro per costruire un computer con una rete di novanta processori a 32 core (i processori di un portatile di buona qualità oggi hanno 8 core) in grado di **compiere 80 mila miliardi di operazioni al secondo** (80 teraflop) ed esaminare in un istante **l'equivalente di un milione di libri**. Il tutto per sfidare i due grandi campioni di un celebre quiz televisivo. Nel 2011 l'IBM presentò al pubblico Watson, un computer pronto a gareggiare **su un terreno molto più insidioso di una scacchiera, quello del linguaggio**. Watson doveva vincere al quiz televisivo di cultura generale *Jeopardy!* sfidando i due più forti campioni di sempre Ken Jennings e Brad Rutter.

A una domanda sul più grande aeroporto degli Stati Uniti intitolato a un eroe della Seconda guerra mondiale, rispose col nome di una città canadese: Toronto. E a un quesito sul titolo di un noto libro di consigli di scrittura, *The element of style*, rispose col nome di una scrittrice: Dorothy Parker. Ma alla fine della sfida aveva accumulato una **vincita tre volte più grande di quella dei suoi avversari**, e si aggiudicò un premio da un milione di dollari, che l'IBM diede in beneficenza.

«Credo che Watson abbia il potenziale di trasformare il modo in cui le persone interagiscono con i computer» disse alla rivista «Computerworld» Jennifer Chu-Carroll, una ricercatrice dell'IBM che aveva lavorato al progetto Watson. «È un passo importante poter dialogare con un computer come si fa con un essere umano. Watson non fornisce una lista di documenti in cui si deve cercare, ma dà direttamente una risposta.»

3 volte più grande

La vincita di **Watson** rispetto ai suoi avversari umani **Ken Jennings e Brad Rutter**

Fonte: PCWorld, PLoS

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Roby Rod

Rising contributor
· November 17 at 10:45 PM ·

Hello everyone, how do we create the "need to know" for quantum physics and atomic physics, chapters 27 and 28?
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Phyllis Rogg
November 18 at 10:40 PM ·
Would anyone be able to point me to a video recording of a Zoom meeting where Eugenia met with a small group of HS students, all girls? She met with them to encourage them to take Physics or how to approach learning in general. I cannot find it right now. It was from a couple years ago. I think it was shared by the teacher who invited Eugenia to speak with his students?
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Carolyn Sealfon
November 21 at 2:27 AM ·
Invitation to a conference very aligned with ISLE's second intentionality (improving well-being through learning physics), as well as with active learning and co-creativity in STEM more generally: Join us for Cultivating Ensembles 2025!
It will be in New Jersey and I know we got a lot of folks local to NJ...
We also are having an online Community Meeting on Dec. 16. All are welcome! Spread the word 🙂

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Geraldine Cochran
November 27 at 3:31 PM ·
How do you all explain why work is a scalar to students who don't know vector multiplication? Also, for the first time students asked me why work could be positive or negative in my energy-work bar charts when work is a scalar. I explained that it represented that we'd cover what it means for work to be done on a system versus by a system later but for the time being we will think of it as positive or negative with the cosine of the angle between force and displacement determining direction for now. Anybody handle this differently.
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M1kx4UYxhA5XaVA7D6KC11N9AcmYrCRg1ZTFgouzqjKyHumd5oPyJwCU&__tn__=%2CO%2CP-R

Dorota Sawicka

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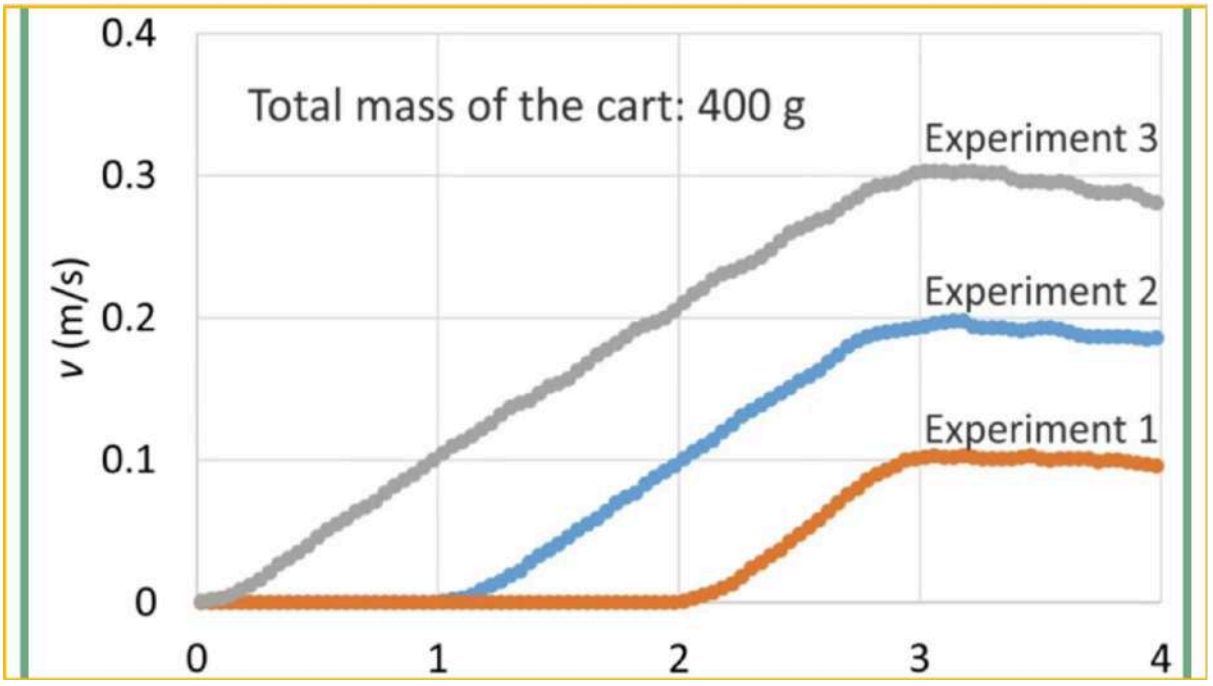
I am looking at the Fan cart activity 6.3.2 in last fall's momentum online workshop. I am wondering why the velocity increases faster for experiments 3 and 2 compared to experiment 1. When I watched the video, I thought that the clock that was displayed was showing that the fan was turned on for the shortest time for experiment 1 but I did not notice anything indicating the time that the fan was started varied in each of the experiments.



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Carolyn Sealfon

Anyone up to read over a draft of a newsletter article on "Embodying Physics" and provide feedback? (I'll post the intro/teaser as a reply.)

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Tom Prewitt

At the risk of exposing myself to ridicule for being so hopelessly behind the pacing guide, I thought I'd share an experience I've had this year with the kinematics "skills for analyzing situations involving motion" (note: not 'solving physics problems!').
When I was in high school (and in college) the instruction I received was "traditional" which is to say information transfer as opposed to exploratory. I've always had a knack for math and so, for me, physics was what we called back then, a "Mickey," a Mickey Mouse, or very easy, class. Perhaps for that reason, I never felt it was very interesting (and yet somehow ended up with a Ph D in it - a fact I largely blame on the Viet Nam war).
This year, in my third year of using ISLE, I finally feel like I am beginning to see the fun in it and I am amazed at how intriguing I find even the simplest situation now analyzed using the 4 step ISLE process. My class and I have been analyzing situatiions (problems) from the textbook and the ALG resources. I have students pair up and use a group white board. And, I force them to go step by step. Students want to skip ahead and find an equation to use. They get stuck. Students who follow the steps (sketch, diagram and graph, before using math) always get to an understanding and reasonable estimate of what the answers should be first. Even I find that I now prefer to follow the ISLE steps (and I have a Ph D! A fact that has previously just blinded me to the beauty of the kinematics).
For me, it has been a revelation that the area under the curve in a v vs t graph is the displacement. Of course, having taken college introductory physics using calculus, intellectually I knew that. But, I didn't "get" it.
Lately, I have been reading some on Robert Jay Lifton and "brainwashing." I read something by him 20-30 years ago. I can't now remember what it was, but I came away with for the first time with the idea that resistance to learning is normal. Most people, I've since seen will fall into the group that is quietly resisting learning or not even being interested in learning whatever it is that I'm hoping they will join me in exploring. Just yesterday, I read an article that said this is most pronounced among people who feel the learning is substitutional (instead of additive). Once again, I am truly impressed with how thoughtful (and deep) the ISLE approach is.
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Noah Segal

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If you teach an intro physics class using the ISLE method and teach another course like AP C Mechanics where students are seeing many topics the second time around, do you use the ISLE method again but use different investigations? Or do you use a different learning cycle?
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Timothy Magill

We're close to concluding ch.6, impulse & linear momentum. As you know, we talk here about systems being isolated (or not), i.e., not acted on by an external force (or is). Question: I've just come across an old AP question using terms "open system" and "closed system". Are these exact synonyms for "not isolated" and "isolated", respectively? Or is there some additional subtlety? Can anyone help me?

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Timothy Magill

What is the preferred avenue for reporting suspected errata (for the text, the instructor's guide, etc.)?

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Timothy Magill

I have a win I'd like to share. Several weeks ago, I tried something new in my classes. I had my students take their chapter test in their small groups, rather than individually. A heard a guilty voice in the back of my head, worried that some fraction of the students would happily ride their classmates' coattails and achieve scores that do not reflect their personal level of understanding.
The actual event was truly a wonder to behold: almost without exception, students were engaged and conversant. I found almost no one sitting back and coasting. The conversations were full of appropriate physics terms, evidence, and – importantly – counter-evidence from teammates who disagreed. I heard students recall specific evidence from class ALG activities/demonstrations. I'm confident that a visitor to my class, such as a parent or administrator, would have been impressed by the level of focused attention and engagement that was on display.
Although it could be true that there were students getting better scores than they would have own their own, I firmly believe that virtually every student left the test with deepened

understandings. Whether they'd come into the test well prepared or not, I believe they came out better.
Consequently, I've determined to lean on group work for at least some portion of my future assessments.
I've other wins to report, but for now I'll stop here.
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Marc Reif

Sorry if this has been posted earlier, but I've been out of touch with this group. Is there a 3rd edition of Explore and Apply in the works?
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Val Monticue

Hi, folks, I'm taking a qualitative analysis course for my EdD program and would like to interview physics teachers who have attempted to bring social justice topics into their classrooms, particularly around any obstacles you faced.
If you are interested or have a colleagues who would like to share their story, please let me know.
More info: My dissertation will be creating physics curriculum that combines physics education research, culturally relevant pedagogy (CRP), and strength based teaching methods. So far the literature shows that there's a lot of work being done with the belonging and inclusion parts of CRP, but the wider social justice aspect is challenging. I want to learn more about those challenges from people who have tried to tie it in or even wanted to and received push back or didn't feel safe/supported in doing so.
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Gorazd Planinsic

Hi all! Today I am posting a little New Year gift: an ISLE-based problem for geometrical optics, Chapter 22. The problem involves all aspects of ISLE-based reasoning: interpreting a representation of data, identifying patterns, coming up with a model and testing the model.

The experimental part can be done with simple equipment, using a smart phone as a light sensor. The problem is also connected to the discovery of binary stars. If you are teaching astronomy, you can use it there too.

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