

Physics 101H

General Physics 1 - Honors



Lecture 3 - 9/2/22

Mechanics survey



Welcome!

I am **Prof. Monahan**

Pronouns: he/him/his

Email: cjmonahan@wm.edu

Office: Small Hall 326C

Am I in the right room?



Don't be put off if you are not fully comfortable with Taylor series!



This course: for students who **intend to major in physics or physical sciences**

I assume you have a strong preparation in mathematics

- Comfortable with **calculus**

PHYSICS 101 (not this course!) does not assume knowledge of calculus

- Held at the same time
- Uses the same textbook
- Add/Drop deadline is **11:59 pm on Monday September 12**



DO NOT MISS THIS DEADLINE



Summary



You should now have unlimited uploads for Problem Set 0.

Topics

This week

- Course introduction
- Problem solving
- Mechanics

Next week

- Vectors
- Kinematics in 1D
- Kinematics in 2D

Announcements

Monday: no class

Wednesday: Problem set 0 due

Problem set 1 assigned



Two minute essay

*This is an example of *retrieval practice*, for which there is lots of evidence demonstrating effectiveness in improving learning through knowledge retention.

Instructions: Write one paragraph on the following topic. You have two minutes. You may not use your notes and you should not consult with others around you. Your answer will not be graded; your answer is for your own learning and you don't need to share your answer.*

Question: Describe the problem solving strategies we discussed yesterday. What do you think is going to be most useful for you in the future and why?

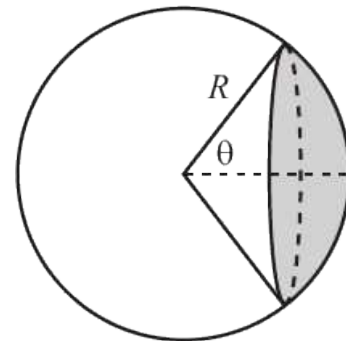


Multiple choice

Instructions: Consider the following question. After you have had a chance to think, I will ask you to raise your hands to indicate your answer.

Question: Which of the following expressions could be the volume of the shaded region of the sphere shown in the figure, obtained by slicing the sphere with a vertical plane perpendicular to the plane of the screen?

- (a) $\pi R^3 (4/3 - (2/3) \sin \theta)$
- (b) $\pi R^3 ((2/3) \sin \theta)$
- (c) $\pi R^3 (2/3 - (2/3) \cos \theta + \sin \theta)$
- (d) $\pi R^3 (2/3 + (1/3) \cos^3 \theta - \cos \theta)$





Mechanics survey

Instructions: Please complete the following multiple choice survey. The survey is **ungraded**, and is intended to help the department understand how to help you learn physics. Your score **does not matter** and you will receive **participation credit**.

Please **write your name** on the cover sheet. You will receive **extra credit** for completing the survey. (I will include it as part of your grade for Problem Set 0.)

You have 30 minutes. Answer **as many questions as you can**.

You **may not use electronic devices: phones, tablets, laptops, etc.**



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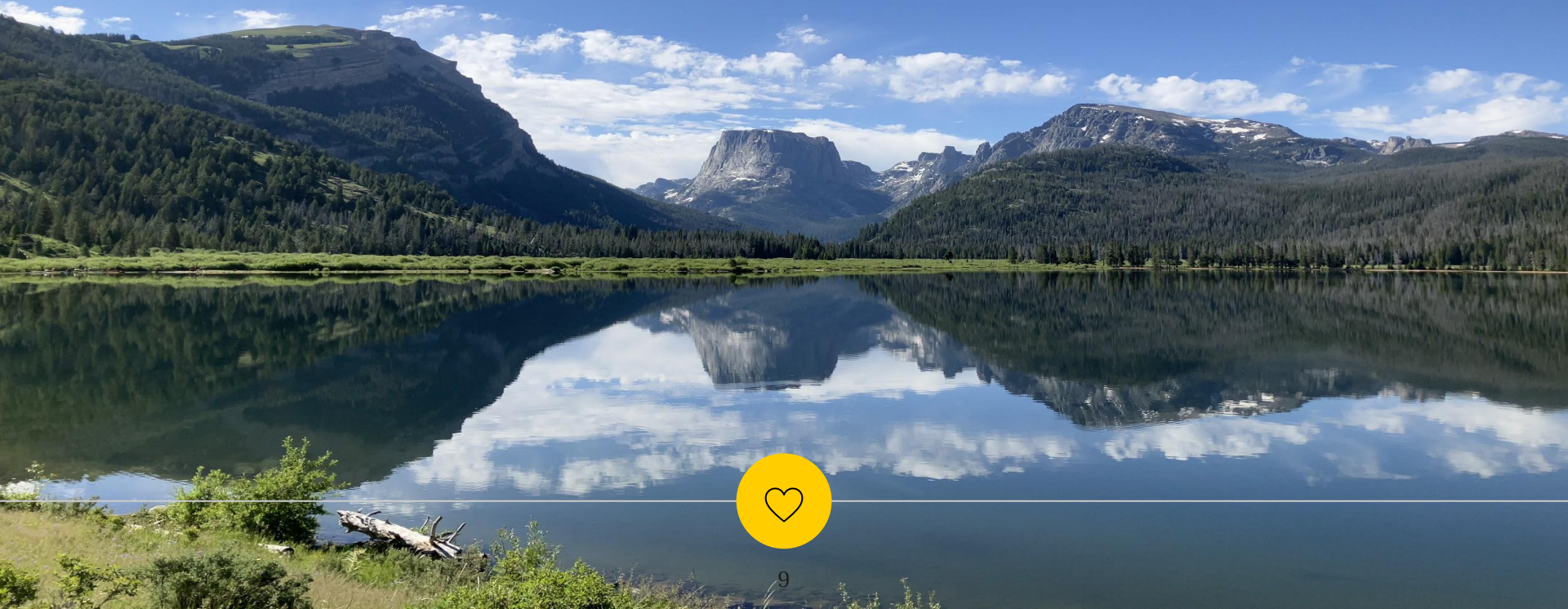
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**THERE IS NO CLASS
ON MONDAY**



PHYSICS 101 - HONORS

Lecture 3 9/2/22

Volume example:

Known: volume of sphere = $\frac{4\pi R^3}{3}$

Limits: $\vartheta \rightarrow 0 \Rightarrow V_{\text{shaded}} = 0$

And $\sin \vartheta \rightarrow 0$, $\cos \vartheta \rightarrow 1$

\Rightarrow rules out (a) (a) = $\pi R^3 \left(\frac{1}{3} - 0 \right) = V_{\text{sphere}}$ $\ddot{\smile}$

$\vartheta \rightarrow \pi \Rightarrow V_{\text{shaded}} = V_{\text{sphere}}$

And $\sin \vartheta \rightarrow 0$, $\cos \vartheta \rightarrow -1$

\Rightarrow rules out (b) (b) = $\pi R^3 \cdot \frac{2}{3} \cdot 0 = 0$ $\ddot{\smile}$

Special case: $\vartheta = \frac{\pi}{2}$, $\sin \vartheta = 1$, $\cos \vartheta = 0$

\Rightarrow rules out (c) \Rightarrow answer is (d)!

(c) = $\pi R^3 \left(\frac{2}{3} - 0 + 1 \right) = \frac{5\pi R^3}{3}$ $\ddot{\smile}$