L2-1: Representations of Volume

You want to determine the volume of the room you are in.

(a) Write a description of how to find the volume of the room in words.

(b) Sketch a diagram that would help you find the volume of the room.

(c) Write a symbolic expression that would allow you to find the volume of the room. Check the units of your expression.

(d) Without standing up, estimate the volume of the room as a number. Make sense of the number by comparing it to something.

Challenges in Taking Physics

"I remember taking my first Physics class as a freshman. Before coming to college, I didn't worry much about grades, so I felt unprepared for the increased workload and differences in grading. I remember being surprised after getting burned grade-wise several times, and feeling stressed as a result. But then I got some help from the instructor and the TA, found a study group, and was able to turn things around. Looking back now, **I think my struggles were pretty normal.** Even though people don't like to admit it, basically everyone has trouble with certain concepts. Although it was a somewhat rocky start, it felt good to learn from my mistakes, and **I am proud of the success I have had.**"

—Nathan, Pitt Bioengineering Senior

"I was one of just a handful of women in one of my intro physics study groups, and sometimes I felt a little embarrassed to ask questions. However, **I quickly learned that other students usually had the same question I did**, and we all benefitted from working with each other and learning from each other. Sometimes I had difficulty with an idea that my classmates understood. Other times, they struggled with concepts that I understood. I remember there wasn't always an "aha!" moment, where everything clicked. It was usually much more gradual, with some concepts only becoming clear after lots of practice and discussion with my study group. **I realized that everyone struggles some times**, and the important thing is to not give up and help each other out."

—Allison, Pitt Electrical Engineering Senior

Challenges in Taking Physics

"When I first got here, I was worried because I was really struggling with some of the physics concepts. **It felt like everyone else was doing just fine**, but I just wasn't sure if I was cut out for a physics course. At some point during the first semester, I came to realize that, actually, a lot of other students were struggling, too. And **I started to look at struggling as a positive thing.** After I struggled with a hard problem and then I talked to other classmates and my TA about the solution—I realized that all that effort was worth it because it helped me learn and remember much more."

—Aniyah, Pitt Chemical Engineering Graduate

"I didn't go to a very good high school, and **I was worried that my high school courses had not prepared me well for college.** Honestly, when I got here, I thought professors were scary. I thought they were critical and hard in their grading, and sometimes it felt like they put things on the quizzes or exams that we hadn't discussed in class. But then I realized that the professor wanted me to be able to apply the physics concepts in many different situations. So I started to study in a way that would help me do that, and **I did my best to learn from my mistakes on quizzes and exams.** And I saw that even when the professors' grading seemed tough, it didn't mean they looked down on me or that I didn't belong. It was just their way of motivating high achieving students."

—Anil, Pitt Civil Engineering Senior

Challenges in Taking Physics

With your small group, discuss what you wrote about in the first Get-Ready activity and the quotes you have just read. Please answer the following questions as a group:

- What are some common themes across several of the quotes we read?

- Why do you think that sometimes students don't realize that other people are also struggling with the course?

L2-2: Driving to Portland

Discuss "sensemaking" with your group. Identify several ways of making sense of answers or contexts you have used in math or science courses.

(a) Identify several ways of making sense of answers or contexts you have used in math or science courses.

You are driving from Corvallis to Portland, and you measure how full your gas tank is (in gallons) as a function of time (in hours):

$$G(t) = G_0 - \beta t^2$$

(b) Make sense of this expression with your group in as many different ways as you can, making use of as many different representations as you can.

L2-3: Represesetations of Vectors

Discuss **vectors** with your group.

Write down a list of things about vectors on your shared whiteboard. You can write:

- words or sentences

- numbers or symbols

- pictures or diagrams

Write large!

L2-4: Vectors in a Garden

You visit a garden with a trail that includes the following landmarks.

- Red roses at $\vec{r}_r = -3a\hat{x}$

- White roses at $\vec{r}_w = +4a\hat{x}$

- A pond at $\vec{r}_p = 0\hat{x}$

- A bench at $\vec{r}_b = -a\hat{y}$

- A bridge over a creek at $\vec{r}_c = -a\hat{x}$

- A statue at $\vec{r}_s = +2a\hat{x}$

(1) Sketch and label the garden and its landmarks.

(2) Find the following displacement vectors using both symbols and diagrams.

(a) From the red roses to the white roses

(b) From the pond to the red roses

(c) From the bench to the statue