## Build a Warmup Assignment

**Name:** _____

**Institution:** _____

**Specific course:** _____

**Specific topic**_____

**Key Idea(s):** _____, _____, _____

_____, _____, _____

**New Jargon:** _____, _____, _____

_____, _____, _____

**Important skills:** _____, _____, _____

_____, _____, _____

_____, _____, _____

**Build your Warmup Assignment** by forming a few questions. Use the template questions on the back if needed. There is an example attached.

Question:

Question:

Question:

Question: Explain what <jargon> means in your own words.

Question: Explain the similarities and differences between the terms <jargon 1> and <jargon 2>

Question: <Key Idea> is used to describe <situation>. What can you say about <this example>

Question: Which of the statements following do you think is true? Explain your reasoning

a. <True statement>
b. <False Statement>
c. <Common misconception>
d. <Both a and c>
e. None of the above

Question: <key idea> is similar in some ways to <previous key idea>. What are the important similarities? What are the important differences?

Question: Under what circumstances can we use <important skill>? What are some circumstances in which <important skill> does not apply?

Question: Rank the following <things> in order of <property>. Explain how you determined your ranking.

Question: Applied properly, <key idea> has the potential to help millions of people. Are there also disadvantages to <key idea>? What are the most serious?

Question: <Unusual thing> happens in certain circumstances. How does <key idea> explain this?

Question: We have solved problems before using <old skill>. What new problems can <important skill> solve that <old skill> could not?

Question: Give an example of how <key idea> applies to your daily life.

Question: Give an example of how <key idea> is used in real world applications.

Estimate the <newly defined quantity> of <familiar thing/situation>

# Example 1: Algebra-based mechanics

**Name:** Tricia McMillan

**Institution:** University of Dentrass

**Subject taught:** General Physics I

**Specific topics:** Fluid Statics

**Key Idea(s):** Pressure, Archimedes Principle

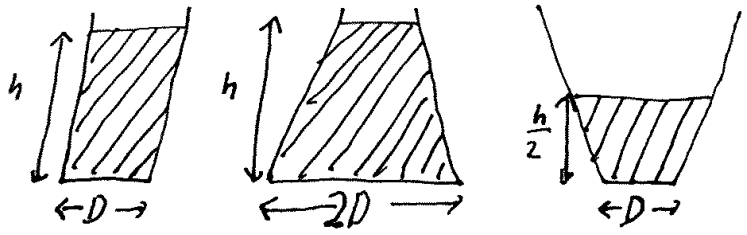
**New Jargon:** Density, Absolute and Gauge pressure,

**Important skills:** Determine the absolute and gauge pressure at a given point in a liquid, solve problems relating the densities of a liquid, an immersed object, and the buoyant force.

**Build your Warmup Assignment** by forming a few questions.

Question 1: In your own words, explain the difference between absolute pressure and gauge pressure. When would you want to use one or the other?

Question 2: The figure shows three containers. All are filled with the same liquid. Please rank the these in order of increasing pressure as measured at the bottom. Be sure to explain your reasoning!




Question 3: Elijah pushes ball #1 under water in a pool. Nearby, Constance does the same experiment with ball #2. What do you need to know to figure out who must push harder to keep their ball under water? Explain how you made your choices.

a) The densities of the balls b) The depth of each ball
c) The diameters of the balls d) The density of water e) The density of water

# Example 2: 300 level E&M

**Name:** Tricia McMillan

**Institution:** University of Dentrass

**Subject taught:** Intermediate Electromagnetism

**Specific topics:** The day we introduce multipole expansions

**Key Idea(s):** Magnetic forces and fields, Biot-Savart law

**New Jargon:** Multipoles, Legendre polynomials

**Important skills:** Calculate the first three multipole moments of a discrete or discontinuous charge distribution. Understand how the multipole potentials and fields vary with distance. Understand the effect of coordinate changes.

**Build your Warmup Assignment** by forming a few questions.

Question 1: In your own words, explain why it is useful to expand a charge distribution in terms of multipole moments.

Question 2: In words, suggest a way to build a charge distribution that would have an electric field that drops off as $1/r^4$

Question 3: A charge of $+e$ and a charge of $-e$ located 1 nm apart have a dipole moment of $1.6 \times 10^{-28}$ C·m, but these two charges are not truly "a dipole." Why not? What is an ideal (or pure, or perfect) dipole?

Question 4: Charges of $-q$ are located at $(0, 0, a)$ and $(0, 0, -a)$ and a charge of $2q$ is located at the origin. Determine the first three moments of this charge distribution and describe how its potential varies with $x$ for $0 < x < a/10$ and $x > 10a$.