Wednesday warm-up: unit analysis and vectors

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1 Chapter 1 - Unit analysis, Estimation

1. What is 25 m s^{-1} in km hr^{-1}?
   - A: 15 km hr^{-1}
   - B: 25 km hr^{-1}
   - C: 60 km hr^{-1}
   - D: 90 km hr^{-1}
2. Suppose a ship accelerates from 0 km hr^{-1} to 10 km hr^{-1} in 60 seconds. If acceleration is the change in velocity divided by the change in time, what is the acceleration of the ship?
3. Estimate the area of the North Quad of Whittier College (the open space outside the SLC):
   - A: 5000 m^2
   - B: 5000 cm^2
   - C: 500 m^2
   - D: 500 cm^2
4. A coffee bean is about 0.5 cm^3 in volume. How many could fit in a 2 liter bottle?
   - A: 4×10^1
   - B: 4×10^2
   - C: 4×10^3
   - D: 4×10^4

2 Chapter 2 - Vectors

1. Recently, we have represented 2D vectors like this: $\vec{v} = (v_x, v_y)$. The v_x is the x-component, and the v_y is the y-component. Let us exchange this notation for a different one. Let $\vec{v} = v_x\hat{i} + v_y\hat{j}$. The $\hat{i}$ and the $\hat{j}$ are **unit vectors**, each with length 1. The $\hat{i}$ points in the x-direction, and the $\hat{j}$ points in the y-direction. (a) Let $\vec{v} = -2\hat{i} + 2\hat{j}$, and $\vec{w} = 2\hat{i} - 2\hat{j}$. Draw each in a 2D coordinate system below. (b) What is $\vec{v} + \vec{w}$? (c) What is $\vec{v} - \vec{w}$?