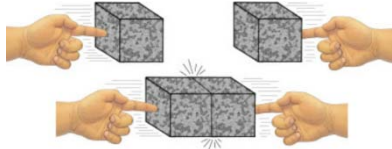



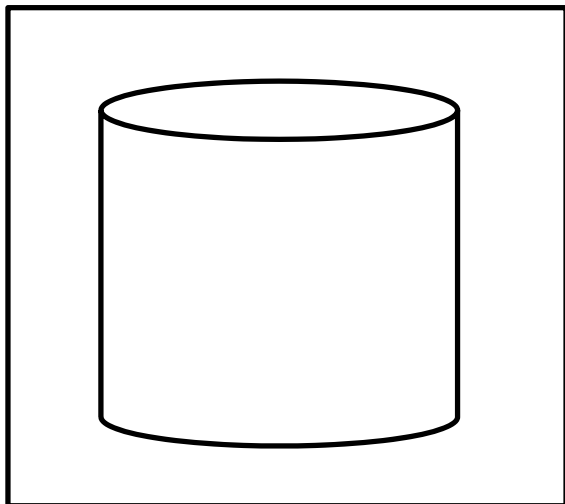
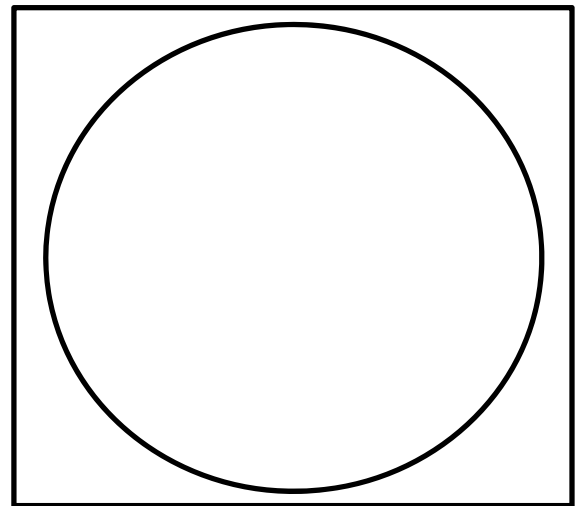
Differentiation – Worksheet to follow the viewing of the demonstration movie available at:

<http://astro.unl.edu/video/demonstrationvideos>

1. The following quantities are related to cubes of Aluminum ($\rho_{Al}=2.7 \text{ g/cm}^3$) and Lead ($\rho_{Pb}=11.3 \text{ g/cm}^3$). (Note $\rho_{Water}=1.0 \text{ g/cm}^3$). Indicate how the two quantities compare by circling the appropriate comparison operator.

Row	Quantity #1	Comparison	Quantity #2
A	the density of Al	> = <	the density of Pb
B	the mass of 1 kg of Al	> = <	the mass of 1 kg of Pb
C	the volume of 1 kg of Al	> = <	the volume of 1 kg of Pb
<p>Two cubes of Pb are merged (used in rows D and E)</p> 			
D	the density of the original left cube	> = <	the density of the new object (merged cubes)
E	the mass of the original left cube	> = <	the mass of the merged cubes
<p>A cube of Al is sliced into two pieces (one 2/3 of the volume, one 1/3 of the volume) (used in rows F and G)</p> 			
F	the volume of the left (split) piece of Al	> = <	the volume of the right (split) piece of Al
G	the density of the left (split) piece of Al	> = <	the density of the right (split) piece of Al

2. A hypothetical planet forms that is composed of 1/3 Al, 1/3 Pb, and 1/3 Fe ($\rho_{Fe}=7.8 \text{ g/cm}^3$) by volume. After formation the object's temperature rises due to heat from radioactive decays and it becomes completely molten. It then differentiates and later cools and solidifies. Sketch a cut-away diagram of the object labeling the composition of any distinct regions.



3. A chef creates a new dressing that is half oil ($\rho_{oil}=0.9 \text{ g/cm}^3$) and half aged balsamic vinegar ($\rho_{vin}=1.2 \text{ g/cm}^3$) by volume. The mixture is well-shaken and three black cherry tomatoes ($\rho_{Tom}=1.1 \text{ g/cm}^3$) are added for decoration. Sketch the final appearance of the dressing container after considerable time has passed indicating the composition of any distinct regions.