Exercise 1.7

(**a**) Three spheres of equal size are composed of aluminum (density $= 2.70$ g/cm³), silver (density $= 10.49$ g/cm³), and nickel (density $= 8.90$ g/cm³). List the spheres from lightest to heaviest. (**b**) Three cubes of equal mass are composed of gold (density $= 19.32$ g/cm³), platinum (density $= 21.45$ g/cm³), and lead (density $= 11.35$ g/cm³). List the cubes from smallest to largest. [Section 1.5]

Solution

Part (a)

The heaviest sphere is the one with the most mass; mass is related to density ρ and volume V by

$$m = \rho V,$$

so the sphere with the most mass has the highest density. Therefore, the spheres from lightest to heaviest are aluminum, nickel, and silver.

Part (b)

The largest cube is the one with the largest volume; volume is related to density ρ and mass m by

$$V = \frac{m}{\rho},$$

so the cube with the largest volume has the lowest density. Therefore, the spheres from smallest to largest are platinum, gold, and lead.