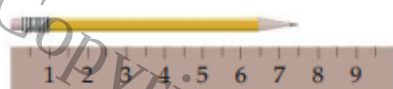
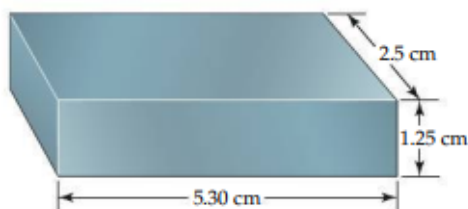


- 1.7 (a) What is the length of the pencil in the following figure if the ruler reads in centimeters? How many significant figures are there in this measurement? (b) An automobile speedometer with circular scales reading both miles per hour and kilometers per hour is shown. What speed is indicated, in both units? How many significant figures are in the measurements? [Section 1.5]



- 1.8 (a) How many significant figures should be reported for the volume of the metal bar shown here? (b) If the mass of the bar is 104.72 g, how many significant figures should be reported when its density is determined using the calculated volume? [Section 1.5]



- 1.9 When you convert units, how do you decide which part of the conversion factor is in the numerator and which is in the denominator? [Section 1.6]
- 1.10 Show the steps to convert the speed of sound, 344 meters per second, into miles per hour. [Section 1.6]
- 1.11 Consider the jar of jelly beans in the photo. To get an estimate of the number of beans in the jar you weigh six beans and obtain masses of 3.15, 3.12, 2.98, 3.14, 3.02, and 3.09 g. Then you weigh the jar with all the beans in it, and obtain a mass of 2082 g. The empty jar has a mass of 653 g. Based on these data estimate the number of beans in the jar. Justify the number of significant figures you use in your estimate. [Section 1.5]



- 1.12 The photo below shows a picture of an agate stone. Jack, who picked up the stone on the Lake Superior shoreline and polished it, insists that agate is a chemical compound. Ellen argues that it cannot be a compound. Discuss the relative merits of their positions. [Section 1.2]



### Classification and Properties of Matter (Sections 1.2 and 1.3)

- 1.13 Classify each of the following as a pure substance or a mixture. If a mixture, indicate whether it is homogeneous or heterogeneous: (a) rice pudding, (b) seawater, (c) magnesium, (d) crushed ice.
- 1.14 Classify each of the following as a pure substance or a mixture. If a mixture, indicate whether it is homogeneous or heterogeneous: (a) air, (b) tomato juice, (c) iodine crystals, (d) sand.
- 1.15 Give the chemical symbol or name for the following elements, as appropriate: (a) sulfur, (b) gold, (c) potassium, (d) chlorine, (e) copper, (f) U, (g) Ni, (h) Na, (i) Al, (j) Si.
- 1.16 Give the chemical symbol or name for each of the following elements, as appropriate: (a) carbon, (b) nitrogen, (c) titanium, (d) zinc, (e) iron, (f) P, (g) Ca, (h) He, (i) Pb, (j) Ag.
- 1.17 A solid white substance A is heated strongly in the absence of air. It decomposes to form a new white substance B and a gas C. The gas has exactly the same properties as the product obtained when carbon is burned in an excess of oxygen. Based on these observations, can we determine whether solids A and B and gas C are elements or compounds? Explain your conclusions for each substance.
- 1.18 You are hiking in the mountains and find a shiny gold nugget. It might be the element gold, or it might be "fool's gold," which is a nickname for iron pyrite,  $\text{FeS}_2$ . What kinds of experiments could be done to determine if the shiny nugget is really gold?