Estimating the Volume of the Human Body
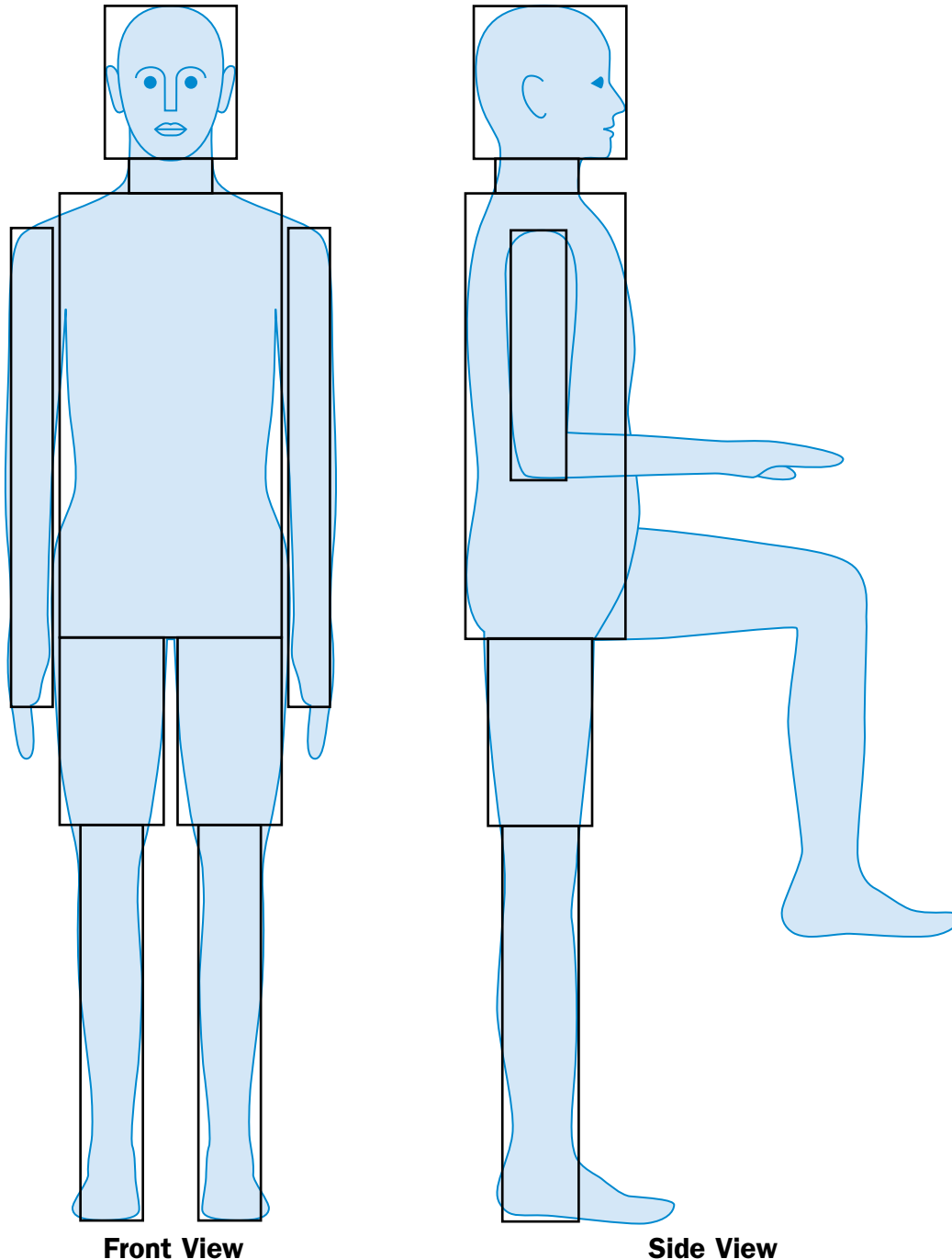
An average adult human male is about 69 inches (175 centimeters) tall and weighs about 170 pounds (77 kilograms). The drawings below show how a man's body can be approximated by 9 rectangular prisms.

The drawings use the scale 1 mm : 1 cm. This means that 1 millimeter in the drawing represents 1 centimeter of actual body length. The height of the drawing below is 175 millimeters. Therefore it represents a male who is 175 centimeters tall.

Front View   **Side View**

6.RP.3, 6.RP.3d, 6.G.2, SMP1, SMP6

1 **a.** Using a centimeter ruler, measure the dimensions of each rectangular prism shown on journal page 256. Use your measurements and the scale 1 mm : 1 cm to record an approximation for actual body dimensions in the table below. For example, if you measure the length of an arm as 72 millimeters, this will be recorded as 72 centimeters.

  b. Calculate the volume of each body part and record it in the table. For the arm, upper leg, and lower leg, multiply the volume by 2.

  c. Add the volumes of the parts to find the total volume of an average adult male's body. Your answer will be in cubic centimeters. Sample answers:

Body Part	Actual Body Dimensions (cm)	Volume (round to the nearest 1,000 cm³)
Head	Width: 19 Depth: 22 Height: 22	* 1 = 9,000
Neck	Width: 12 Depth: 12 Height: 5	* 1 = 1,000
Torso	Width: 32 Depth: 23 Height: 64	* 1 = 47,000
Arm	Width: 6 Depth: 8 Height: 69	* 2 = 7,000
Upper leg	Width: 15 Depth: 15 Height: 27	* 2 = 12,000
Lower leg	Width: 9 Depth: 11 Height: 57	* 2 = 11,000
	Total Volume: About	87,000 cm³

2 **a.** One liter is equal to 1,000 cubic centimeters. Use this fact to complete the statement:

  An average adult male's body has a volume of about __87__ liters.

  b. One liter of water has a mass of 1 kilogram (kg). Using this as a guide, is your estimate for the total volume of an adult male's body reasonable? __Yes.__

  c. Use the information at the top of journal page 256 to justify your answer.

  Sample answer: 87 liters would weigh 87 kg, which is close to 77 kg.

3 Make a reasonable estimate.
The volume of an average adult male's torso is about __50__% the total body volume.

6.RP.3, 6.RP.3d, 6.G.2, SMP1, SMP6