boldfaced or *italicized.* (You will learn the difference between the two in the chapter "Two-Dimensional Motion and Vectors.") Units are abbreviated with regular letters (sometimes called roman letters). Some examples of variable symbols and the abbreviations for the units that measure them are shown in **Table 8.**

As you continue to study physics, carefully note the introduction of new variable quantities, and recognize which units go with them. The tables provided in Appendices C–E can help you keep track of these abbreviations.

extension

Integrating Chemistry
Visit go.hrw.com for the activity "Dependent and Independent Variables."

Keyword HF6SOPX

Table 8 Abbreviations for Variables and Units

Quantity	Symbol	Units	Unit abbreviations
change in vertical position	Δy	meters	m
time interval	Δt	seconds	s
mass	m	kilograms	kg

EVALUATING PHYSICS EQUATIONS

Like most models physicists build to describe the world around them, physics equations are valid only if they can be used to make correct predictions about situations. Although an experiment is the ultimate way to check the validity of a physics equation, several techniques can be used to evaluate whether an equation or result can possibly be valid.

Dimensional analysis can weed out invalid equations

Suppose a car, such as the one in **Figure 15,** is moving at a speed of 88 km/h and you want to know how much time it will take it to travel 725 km. How can you decide a good way to solve the problem?

You can use a powerful procedure called *dimensional analysis.* Dimensional analysis makes use of the fact that *dimensions can be treated as algebraic quantities.* For example, quantities can be added or subtracted only if they have the same dimensions, and the two sides of any given equation must have the same dimensions.

Let us apply this technique to the problem of the car moving at a speed of 88 km/h. This measurement is given in dimensions of length over time. The total distance traveled has the dimension of length. Multiplying these numbers together gives the dimensions indicated below. Clearly, the result of this calculation does not have the dimensions of time, which is what you are trying to calculate. That is,

$$\frac{\text{length}}{\text{time}} \times \text{length} = \frac{\text{length}^2}{\text{time}} \text{ or } \frac{88\text{ km}}{1.0\text{ h}} \times 725\text{ km} = \frac{6.4 \times 10^4\text{ km}^2}{1.0\text{ h}}$$

Figure 15
Dimensional analysis can be a useful check for many types of problems, including those involving how much time it would take for this car to travel 725 km if it moves with a speed of 88 km/h.